

ENGINEERING IN WOOD 1960

OUR 31ST YEAR

TIMBER STRUCTURES, INC.

glued laminated arches
beams
rigid frames
trusses
decking

First National Bank of Oregon, Portland, Oregon. Architect: Balzhiser, Seder & Rhodes, Eugene, Oregon

ENGINEERING IN WOOD

WITH GLUED LAMINATED STRUCTURAL TIMBERS

Imaginative architects, engineers and designers find in glued laminated (glulam) timbers by Timber Structures, Inc., a material of greatest usefulness and adaptability. Combining the natural beauty of wood with permanence, fire safety and genuine economy, these structural members are used increasingly in the nation's finest schools, churches, commercial buildings and industrial plants.

Engineered for Specific Use Conditions

Glulam members at Timber Structures, Inc. are carefully designed to meet the requirements of each specific structure. Sections are specified for requirements of anticipated loads; connections are developed to join the timber members into assemblies of known strength which provide ample safety margins. Engineering is done according to the standards of American Institute of Timber Construction (A.I.T.C.) and other recognized authorities.

Manufactured Under Strict Quality Control

In "factory growing" glulam timbers at Timber Structures, Inc., nothing is left to chance. Constant and unremitting quality control is maintained in the selection of laminating stock, drying, surfacing, glues and glue application, clamping, finishing, fabrication and shipping. This results in a finished product of uniform, high quality.

Dimensionally Stable, "Stay Put" in Place

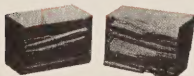
Glulam timbers by Timber Structures, Inc. are formed to the exact size and shape desired, using only thoroughly kiln dried material. Finished members are free from seasoning action, and remain dimensionally stable in the structure.

Due to the superior strength of seasoned material and the confining of knots to one lamination, glulam timbers are stronger pound-for-pound than other structural material. Architects therefore achieve slenderness without compromising strength, and obtain massive sections without seasoning action.



Glulam beam, although 1/3 smaller in section, has the same load carrying strength as larger sawn beam.

Strong, Permanent Glues



Glulam member, sheared under pressure of 1,686 pounds PSI, shows 95% failure in the wood.

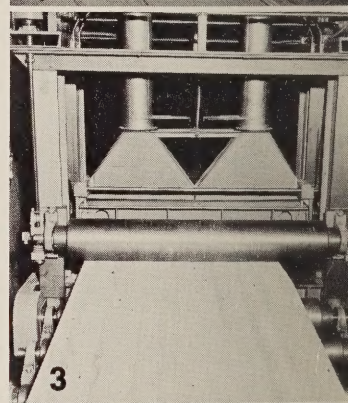
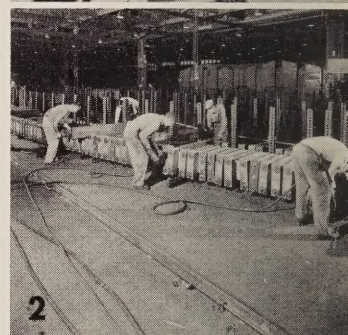
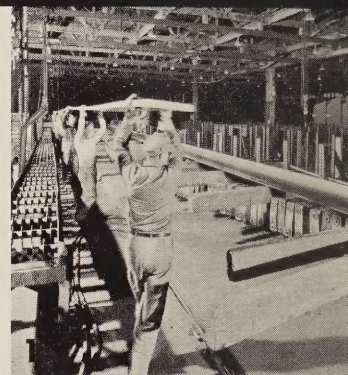
End use of the timber determines the types of glues used. For interior applications moisture-resistant casein-type glues are used. When exposed to weather or excessive interior moisture, glues are of waterproof exterior type phenol, resorcinol or melamine resin.

Precision Fabrication for Fast Erection

Glulam timbers are formed to full size patterns which show the precise location and nature of each fabricating operation. Since the patterns fit perfectly, the finished members fit together at the jobsite, assuring fast, easy erection.

"Factory Growing" structural timbers through the process of glued lamination

1. Gluing
2. Applying pressure in the jig.
3. Planing laminated timber.
4. Protective wrapping.



Dimension and design data given in this brochure are for the convenience of architects and engineers for general preliminary use, and in all cases are subject to check for local conditions and codes. This information is based upon standard materials and production practices of Timber Structures, Inc., and its use by others is expressly forbidden.



INDEX

Resists Destruction by Fire, Wind, Shock



Glulam timber after one hour's exposure to direct flames at average temperature of 1,587 degrees retains 51% of original section.

Wood naturally has excellent insulating properties, and stubbornly resists penetration of heat. Based upon this unique property, heavy timber or "mill type" construction was developed over a century ago, with sections heavy enough to withstand severe fires and still have more than sufficient strength to support their design loads.

To test this power to resist fire, a 9" x 27¼" standard glulam beam was exposed to direct flames for a full hour. Temperatures ranged from 1,350 degrees to 1,850 degrees, and averaged 1,587 degrees. As shown by the accompanying photograph, 51% of the section remained after the end of the test. Based upon the ultimate strength of the material, the beam was capable of continuing in service with ample safety factor. No lateral expansion occurred during the exposure; hence in actual fire no outward thrust would be exerted upon sidewalls.

Because of its effective resistance to destruction by fire, heavy timber construction is generally rewarded by favorable fire insurance rates.

Engineered timber construction further has a resilience or "give" which preserves strength under shock of wind and seismic impact, frequently leaving structures sound when other types of buildings have suffered heavy damage.

Suitable for Any Sheathing

Dimensional stability of glulam timbers makes them ideal for use with any sheathing including timber, gypsum plank, concrete plank and slabs, or flat or corrugated steel. All are readily and easily applied to the glulam members.

Timber Structures, Inc. offers a selection of high quality wood sheathing in whatever thickness is required. This includes the beautiful Tim-Deck shown on pages 22 and 23 of this brochure.

Preservative Treatments Available

Under normal conditions timber members are fully adequate for permanent use without further processing. For severe exposures, approved pressure treatments are available through Timber Structures, Inc. Treating may be done either before or after lamination, and the treated members are permanent structural members in every sense of the term.

ARCHES

three-hinged	4, 5
typical haunch section sizes	6, 7
two-hinged (barrel)	8
dimensions of barrel arches	9
arch and purlin details	10
section properties of glulam members ..	11

GLUED LAMINATED

RIGID FRAMES	12, 13
rigid frame dimensions	13

BEAMS AND PURLINS

typical sizes	15
typical beam details	15

SPECIFICATIONS

glued laminated structural members ..	16, 17
glued laminated appearance grades	17

TRUSSES

Tim-Truss bowstring truss	18, 19
specifications	19

GLUED LAMINATED DOMES

DECKING

Tim-Deck details	22
Tim-Deck specifications	23

REGIONAL OFFICES

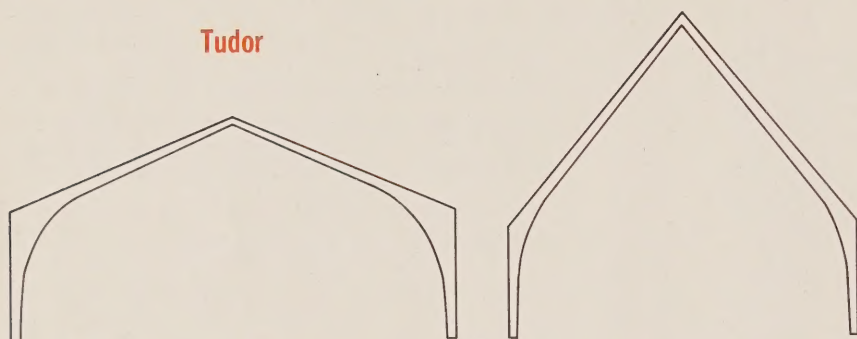
AND REPRESENTATIVES	24
---------------------------	----

Timber Structures three-hinged arches. In providing permanent structural framing for both roof and sidewalls, these handsome arches add greatly to the beauty of the interior. They are therefore widely used when appearance requirements are most rigid—in churches, schools, libraries, stores, gymnasiums and auditoriums. Three-hinged arches are of three principal types: Tudor, Gothic and continuous. Spans usually range between 30 and 100 feet, although much wider spans are possible when desired.

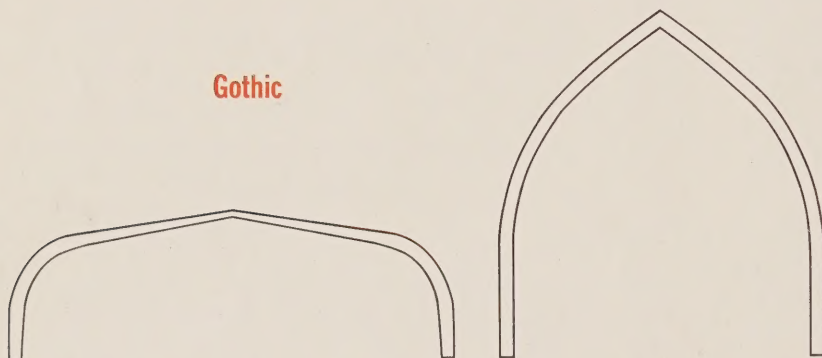
THREE HINGED ARCHES

DETAILS

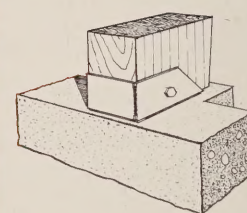
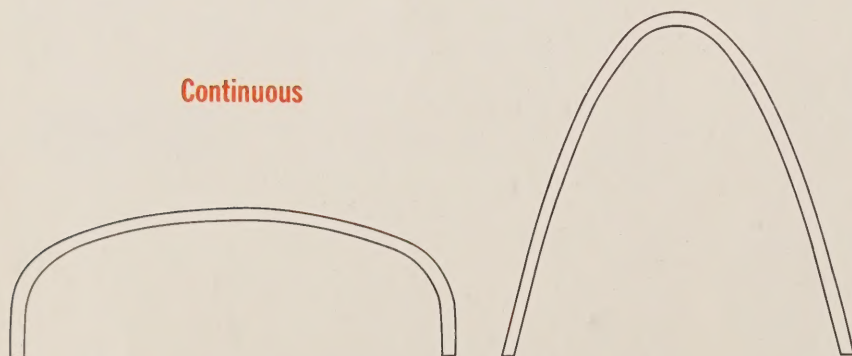
Tudor



Gothic

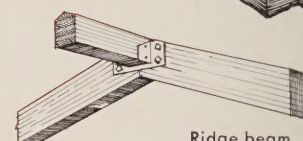
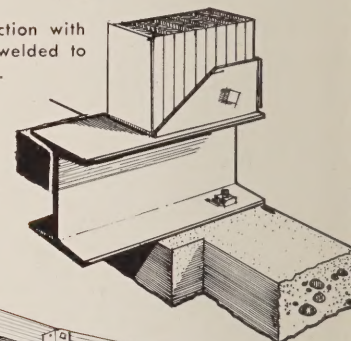


Continuous

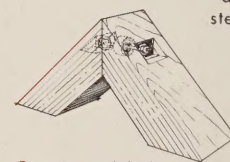


Heel connection with steel shoe anchored to concrete.

Heel connection with steel shoe welded to steel girder.

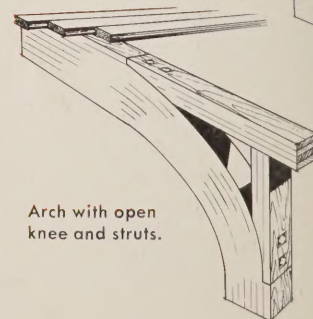
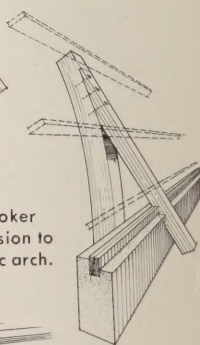


Ridge beam connected to arch with steel shoe.



Countersunk bolt and shear plate connection at peak.

Outlooker extension to Gothic arch.



Arch with open knee and struts.



INSTALLATIONS

CIVIC CENTER, Charleston, West Virginia. Eight Gothic arches of 206' span are spaced at 25 feet to frame the roof and sides of the building. Roof is applied over glulam purlins spaced at 8 feet. Arches are 31'-6" high at the wall, 66'-6" at the center. Seating capacity at basketball games is 6,200.

Architects: Martens and Son, Irving Bowman and Glenn C. Hancock, Charleston.

Contractor: Kenhill Construction Co., Charleston.

IMMANUEL LUTHERAN CHURCH, Des Plaines, Illinois, is 58'-8" x 135'-10" in size. High rise Tudor arches are 38 feet in span, with wall height of 10' and center height of 35'-4". Spacing of arches is 20 feet. Heavy timber decking is supported by glulam purlins spaced at 7'-11". Seating capacity is 500.

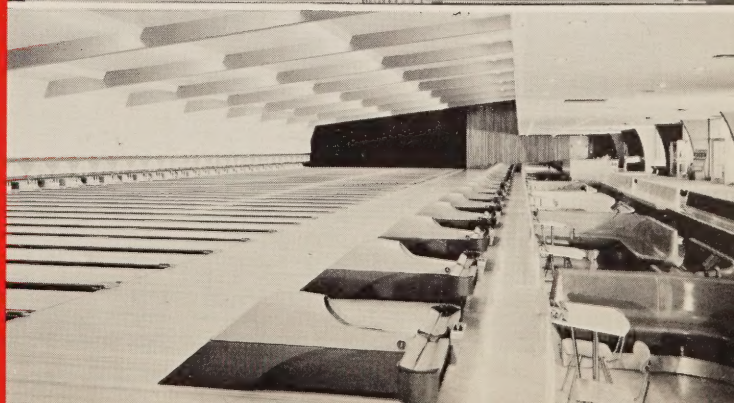
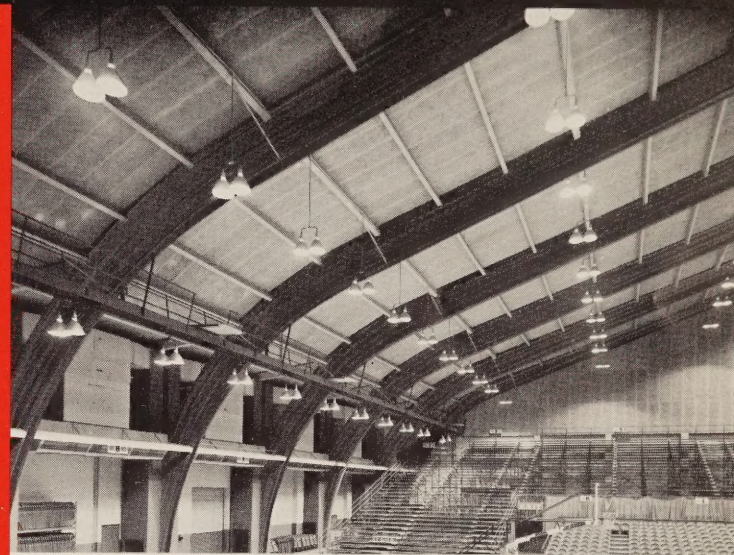
Architects: Charles Edward Stade and associates M. Dolan and H. Anderson, Park Ridge, Illinois.

Contractor: Stade Construction Company, Park Ridge, Illinois.

SATELLITE BOWL, Inkster, Michigan uses Gothic arches spaced at 22'-2 $\frac{3}{4}$ " to provide framing for roof and sidewalls of 42-lane bowling alley. Arches are asymmetrical in design in order to give maximum head room over spectator section. By adding additional arches, building can be extended to provide more lanes in the future.

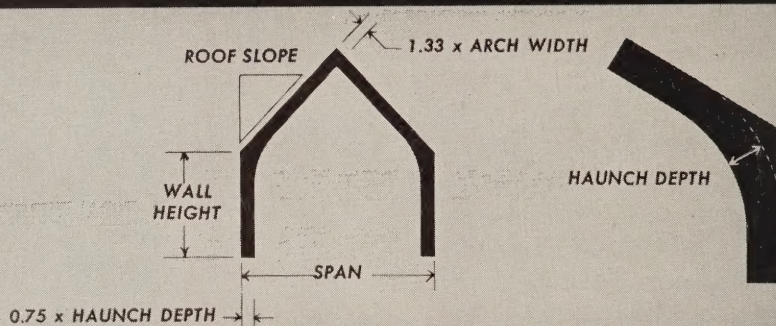
Engineers: Campbell Engineering Company, Inc., Detroit.

Contractor: H. F. Campbell Construction Company, Inc., Detroit.



THREE HINGED ARCHES / TYPICAL HAUNCH SECTIONS

tudor arches — 3-hinged
depth increments
based on 3/4" laminations

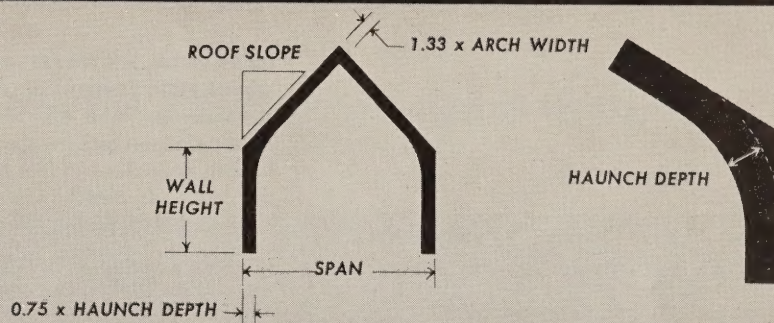


Roof Slope	SPAN 30 FEET						SPAN 40 FEET						SPAN 50 FEET					
	Wall Ht. (Ft.)	Vertical Loadings—Pounds per Lineal Foot of Span					Wall Ht. (Ft.)	Vertical Loadings—Pounds per Lineal Foot of Span					Wall Ht. (Ft.)	Vertical Loadings—Pounds per Lineal Foot of Span				
		400	600	800	1,000	1,200		400	600	800	1,000	1,200		400	600	800	1,000	1,200
	8	3 1/4 x 9 3/4	5 1/4 x 9	5 1/4 x 10 1/2	5 1/4 x 12	5 1/4 x 15	10	5 1/4 x 9 3/4	5 1/4 x 13 1/2	5 1/4 x 16 1/2	5 1/4 x 20 1/4	7 x 17 1/4	10	5 1/4 x 12	5 1/4 x 17 1/4	7 x 16 1/2	7 x 19 1/2	7 x 23 1/4
	10	3 1/4 x 10 1/2	5 1/4 x 12	5 1/4 x 12	5 1/4 x 14 1/4	5 1/4 x 15 3/4	12	5 1/4 x 12	5 1/4 x 14 1/4	5 1/4 x 16 1/2	5 1/4 x 20 1/4	7 x 18	12	5 1/4 x 14 1/4	5 1/4 x 18	7 x 18	7 x 21	7 x 23 1/4
	12	3 1/4 x 12	5 1/4 x 11 1/4	5 1/4 x 12 3/4	5 1/4 x 15	5 1/4 x 17 1/4	14	5 1/4 x 13 1/2	5 1/4 x 16 1/2	5 1/4 x 18 3/4	5 1/4 x 21	7 x 20 1/4	14	5 1/4 x 15 3/4	5 1/4 x 19 1/2	7 x 18 3/4	7 x 22 1/2	7 x 25 1/2
	14	5 1/4 x 10 1/2	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 15 3/4	5 1/4 x 17 1/4	16	5 1/4 x 14 1/4	5 1/4 x 17 1/4	5 1/4 x 20 1/4	7 x 18 3/4	7 x 21 3/4	16	5 1/4 x 17 1/4	5 1/4 x 21	7 x 20 1/4	7 x 23 1/4	7 x 26 1/4
	16	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 15	5 1/4 x 17 1/4	5 1/4 x 18 3/4	18	5 1/4 x 15	5 1/4 x 18 3/4	7 x 18	7 x 21	7 x 22 1/2	18	5 1/4 x 18 3/4	7 x 19 1/2	7 x 22 1/2	7 x 25 1/2	7 x 27 3/4
	8	3 1/4 x 9	3 1/4 x 12	5 1/4 x 11 1/4	5 1/4 x 12 3/4	5 1/4 x 14 1/4	10	5 1/4 x 9 3/4	5 1/4 x 12	5 1/4 x 16 1/2	5 1/4 x 19 1/2	7 x 17 1/4	10	5 1/4 x 11 1/4	5 1/4 x 15 3/4	7 x 15 3/4	7 x 18 3/4	7 x 21 3/4
	10	3 1/4 x 10 1/2	5 1/4 x 9	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 15 3/4	12	5 1/4 x 12	5 1/4 x 15	5 1/4 x 16 1/2	5 1/4 x 19 1/2	7 x 17 1/4	12	5 1/4 x 13 1/2	5 1/4 x 16 1/2	7 x 16 1/2	7 x 20 1/4	7 x 22 1/2
	12	3 1/4 x 12	5 1/4 x 11 1/4	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 15 3/4	14	5 1/4 x 13 1/2	5 1/4 x 16 1/2	5 1/4 x 18 3/4	5 1/4 x 21	7 x 20 1/4	14	5 1/4 x 15 3/4	5 1/4 x 18 3/4	7 x 18 3/4	7 x 21	7 x 24
	14	5 1/4 x 10 1/2	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 15 3/4	5 1/4 x 16 1/2	16	5 1/4 x 14 1/4	5 1/4 x 17 1/4	5 1/4 x 20 1/4	7 x 19 1/2	7 x 21 3/4	16	5 1/4 x 17 1/4	5 1/4 x 20 1/4	7 x 20 1/4	7 x 22 1/2	7 x 24 3/4
	16	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 15 3/4	5 1/4 x 17 1/4	5 1/4 x 17 1/4	18	5 1/4 x 15	5 1/4 x 18 3/4	7 x 18	7 x 21	7 x 22 1/2	18	5 1/4 x 18	7 x 18 3/4	7 x 21 3/4	7 x 24	7 x 26 1/4
	8	3 1/4 x 9	3 1/4 x 10 1/2	5 1/4 x 9	5 1/4 x 9 3/4	5 1/4 x 11 1/4	10	5 1/4 x 10 1/2	5 1/4 x 12 3/4	5 1/4 x 15	5 1/4 x 16 1/2	5 1/4 x 18	10	5 1/4 x 12	5 1/4 x 15	5 1/4 x 17 1/4	7 x 16 1/2	7 x 20 1/4
	10	3 1/4 x 10 1/2	5 1/4 x 9 3/4	5 1/4 x 12	5 1/4 x 12 3/4	5 1/4 x 14 1/4	12	5 1/4 x 12	5 1/4 x 15	5 1/4 x 17 1/4	5 1/4 x 18 3/4	5 1/4 x 20 1/4	12	5 1/4 x 14 1/4	5 1/4 x 17 1/4	5 1/4 x 19 1/2	7 x 18 3/4	7 x 20 1/4
	12	5 1/4 x 9 3/4	5 1/4 x 12	5 1/4 x 13 1/2	5 1/4 x 15	5 1/4 x 16 1/2	14	5 1/4 x 13 1/2	5 1/4 x 16 1/2	5 1/4 x 19 1/2	5 1/4 x 21	7 x 19 1/2	14	5 1/4 x 15 3/4	5 1/4 x 18 3/4	7 x 18 3/4	7 x 21	7 x 22 1/2
	14	5 1/4 x 10 1/2	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 16 1/2	5 1/4 x 18	16	5 1/4 x 14 1/4	5 1/4 x 17 1/4	5 1/4 x 20 1/4	7 x 19 1/2	7 x 21	16	5 1/4 x 16 1/2	5 1/4 x 20 1/4	7 x 20 1/4	7 x 22 1/2	7 x 24
	16	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 15 3/4	5 1/4 x 17 1/4	5 1/4 x 18 3/4	18	5 1/4 x 15	5 1/4 x 18 3/4	5 1/4 x 21	7 x 21	7 x 21 3/4	18	5 1/4 x 18	7 x 18 3/4	7 x 21	7 x 24	7 x 25 1/2
	8	3 1/4 x 10 1/2	3 1/4 x 12	5 1/4 x 11 1/4	5 1/4 x 12 3/4	5 1/4 x 13 1/2	10	5 1/4 x 11 1/4	5 1/4 x 14 1/4	5 1/4 x 16 1/2	5 1/4 x 18	5 1/4 x 19 1/2	10	5 1/4 x 12 3/4	5 1/4 x 15 3/4	5 1/4 x 18	7 x 18	7 x 18 3/4
	10	3 1/4 x 12	5 1/4 x 11 1/4	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 15 3/4	12	5 1/4 x 12 3/4	5 1/4 x 15 3/4	5 1/4 x 18	5 1/4 x 20 1/4	7 x 18	12	5 1/4 x 14 1/4	5 1/4 x 18	5 1/4 x 20 1/4	7 x 19 1/2	7 x 21 3/4
	12	5 1/4 x 10 1/2	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 15 3/4	5 1/4 x 17 1/4	14	5 1/4 x 13 1/2	5 1/4 x 16 1/2	5 1/4 x 19 1/2	5 1/4 x 21	7 x 20 1/4	14	5 1/4 x 15 3/4	5 1/4 x 19 1/2	7 x 18 3/4	7 x 21	7 x 23 1/4
	14	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 15	5 1/4 x 17 1/4	5 1/4 x 18 3/4	16	5 1/4 x 15	5 1/4 x 18	5 1/4 x 20 1/4	7 x 19 1/2	7 x 21 3/4	16	5 1/4 x 16 1/2	5 1/4 x 20 1/4	7 x 20 1/4	7 x 22 1/2	7 x 24 3/4
	16	5 1/4 x 12	5 1/4 x 14 1/4	5 1/4 x 15 3/4	5 1/4 x 18	5 1/4 x 19 1/2	18	5 1/4 x 15 3/4	5 1/4 x 18 3/4	5 1/4 x 21	7 x 21	7 x 22 1/2	18	5 1/4 x 17 1/4	5 1/4 x 21	7 x 21	7 x 24	7 x 26 1/4
	8	3 1/4 x 9 3/4	3 1/4 x 12	5 1/4 x 10 1/2	5 1/4 x 12	5 1/4 x 13 1/2	10	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 15	5 1/4 x 17 1/4	5 1/4 x 18 3/4	10	5 1/4 x 12 3/4	5 1/4 x 15	5 1/4 x 18	5 1/4 x 19 1/2	7 x 18 3/4
	10	3 1/4 x 11 1/4	5 1/4 x 11 1/4	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 15 3/4	12	5 1/4 x 12 3/4	5 1/4 x 15	5 1/4 x 17 1/4	5 1/4 x 18 3/4	5 1/4 x 21	12	5 1/4 x 14 1/4	5 1/4 x 17 1/4	5 1/4 x 19 1/2	7 x 18 3/4	7 x 21
	12	3 1/4 x 12 3/4	5 1/4 x 12	5 1/4 x 13 1/2	5 1/4 x 15 3/4	5 1/4 x 16 1/2	14	5 1/4 x 12 3/4	5 1/4 x 15 3/4	5 1/4 x 18	5 1/4 x 20 1/4	7 x 19 1/2	14	5 1/4 x 15	5 1/4 x 18 3/4	5 1/4 x 21	7 x 21	7 x 22 1/2
	14	5 1/4 x 10 1/2	5 1/4 x 12 3/4	5 1/4 x 15	5 1/4 x 16 1/2	5 1/4 x 18	16	5 1/4 x 13 1/2	5 1/4 x 16 1/2	5 1/4 x 19 1/2	7 x 18 3/4	7 x 20 1/4	16	5 1/4 x 16 1/2	5 1/4 x 19 1/2	7 x 19 1/2	7 x 21 3/4	7 x 24
	16	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 15 3/4	5 1/4 x 17 1/4	5 1/4 x 18 3/4	18	5 1/4 x 14 1/4	5 1/4 x 17 1/4	5 1/4 x 20 1/4	7 x 19 1/2	7 x 21 3/4	18	5 1/4 x 17 1/4	5 1/4 x 21	7 x 21	7 x 23 1/4	7 x 25 1/2
	8	3 1/4 x 10 1/2	3 1/4 x 11 1/4	5 1/4 x 11 1/4	5 1/4 x 12	5 1/4 x 13 1/2	10	5 1/4 x 11 1/4	5 1/4 x 14 1/4	5 1/4 x 15 3/4	5 1/4 x 18	5 1/4 x 19 1/2	10	5 1/4 x 12 3/4	5 1/4 x 15 3/4	5 1/4 x 18	7 x 17 1/4	7 x 18 3/4
	10	3 1/4 x 12	5 1/4 x 11 1/4	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 15 3/4	12	5 1/4 x 12 3/4	5 1/4 x 15	5 1/4 x 17 1/4	5 1/4 x 18 3/4	5 1/4 x 21	12	5 1/4 x 14 1/4	5 1/4 x 17 1/4	5 1/4 x 19 1/2	7 x 18 3/4	7 x 21
	12	5 1/4 x 10 1/2	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 15 3/4	5 1/4 x 17 1/4	14	5 1/4 x 13 1/2	5 1/4 x 16 1/2	5 1/4 x 18 3/4	5 1/4 x 21	7 x 20 1/4	14	5 1/4 x 15	5 1/4 x 18 3/4	5 1/4 x 21	7 x 20 1/4	7 x 22 1/2
	14	5 1/4 x 11 1/4	5 1/4 x 12 3/4	5 1/4 x 15	5 1/4 x 16 1/2	5 1/4 x 18 3/4	16	5 1/4 x 14 1/4	5 1/4 x 17 1/4	5 1/4 x 20 1/4	7 x 19 1/2	7 x 21	16	5 1/4 x 16 1/2	5 1/4 x 19 1/2	7 x 19 1/2	7 x 21 3/4	7 x 24
	16	5 1/4 x 12	5 1/4 x 14 1/4	5 1/4 x 16 1/2	5 1/4 x 18	5 1/4 x 19 1/2	18	5 1/4 x 15	5 1/4 x 18 3/4	5 1/4 x 21	7 x 20 1/4	7 x 22 1/2	18	5 1/4 x 17 1/4	5 1/4 x 21	7 x 20 1/4	7 x 23 1/4	7 x 25 1/2
	8	3 1/4 x 10 1/2	5 1/4 x 10 1/2	5 1/4 x 12	5 1/4 x 13 1/2	5 1/4 x 14 1/4	10	3 1/4 x 12 3/4	5 1/4 x 12 3/4	5 1/4 x 14 1/4	5 1/4 x 16 1/2	5 1/4 x 18	10	5 1/4 x 12	5 1/4 x 14 1/4	5 1/4 x 16 1/2	5 1/4 x 18 3/4	5 1/4 x 20 1/4
	10	3 1/4 x 12	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 15	5 1/4 x 15 3/4	12	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 15 3/4	5 1/4 x 18	5 1/4 x 19 1/2	12	5 1/4 x 12 3/4	5 1/4 x 15 3/4	5 1/4 x 18	5 1/4 x 20 1/4	7 x 19 1/2
	12	5 1/4 x 10 1/2	5 1/4 x 12	5 1/4 x 14 1/4	5 1/4 x 15 3/4	5 1/4 x 17 1/4	14	5 1/4 x 12	5 1/4 x 15	5 1/4 x 17 1/4	5 1/4 x 18 3/4	5 1/4 x 21	14	5 1/4 x 14 1/4	5 1/4 x 17 1/4	5 1/4 x 19 1/2	7 x 18 3/4	7 x 21
	14	5 1/4 x 11 1/4	5 1/4 x 12 3/4	5 1/4 x 15	5 1/4 x 16 1/2	5 1/4 x 21	16	5 1/4 x 12 3/4	5 1/4 x 15 3/4	5 1/4 x 18	5 1/4 x 20 1/4	7 x 18 3/4	16	5 1/4 x 15	5 1/4 x 18	5 1/4 x 21	7 x 20 1/4	7 x 21 3/4
	16	5 1/4 x 11 1/4	5 1/4 x 13 1/2	5 1/4 x 16 1/2	5 1/4 x 18	7 x 17 1/4	18	5 1/4 x 13 1/2	5 1/4 x 16 1/2	5 1/4 x 18 3/4	5 1/4 x 21	7 x 19 1/2	18	5 1/4 x 15 3/4	5 1/4 x 18 3/4	7 x 18 3/4	7 x 21	7 x 23 1/4

Note: All sections shown are dictated by vertical loadings. On slopes steeper than 10:12, wind load may govern.



tudor arches — 3-hinged
depth increments
based on $\frac{3}{4}$ " laminations

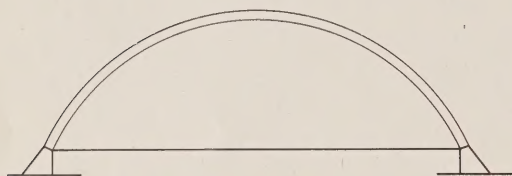


Roof Slope	SPAN 60 FEET						SPAN 70 FEET						SPAN 80 FEET					
	Wall Ht. (Ft.)	Vertical Loadings—Pounds per Lineal Foot of Span					Wall Ht. (Ft.)	Vertical Loadings—Pounds per Lineal Foot of Span					Wall Ht. (Ft.)	Vertical Loadings—Pounds per Lineal Foot of Span				
		400	600	800	1,000	1,200		400	600	800	1,000	1,200		400	600	800	1,000	1,200
	12	5 1/4 x 16 1/2	7 x 17 1/4	7 x 21	7 x 24 3/4	9 x 24	12	5 1/4 x 19 1/2	7 x 20 1/4	7 x 25 1/2	9 x 25 1/2	9 x 28 1/2	14	7 x 20 1/4	7 x 24	9 x 25 1/2	9 x 30	9 x 34 1/2
	14	5 1/4 x 18 3/4	7 x 19 1/2	7 x 21 3/4	7 x 26 1/4	9 x 24 3/4	14	5 1/4 x 21	7 x 22 1/2	7 x 26 1/4	9 x 27	9 x 30	16	7 x 22 1/2	7 x 27	9 x 27 3/4	9 x 30 3/4	9 x 35 1/2
	16	5 1/4 x 20 1/4	7 x 21	7 x 24	7 x 27	9 x 26 1/4	16	7 x 20 1/4	7 x 24 3/4	7 x 27 3/4	9 x 28 1/2	9 x 30	18	7 x 24	9 x 25 1/2	9 x 29 1/4	9 x 32 1/4	9 x 36
	18	7 x 18 3/4	7 x 22 1/2	7 x 25 1/2	9 x 25 1/2	9 x 27 3/4	18	7 x 21 3/4	7 x 26 1/4	9 x 26 1/4	9 x 30	9 x 32 1/4	20	7 x 24 3/4	9 x 26 1/4	9 x 30 3/4	9 x 33 3/4	11 x 33 1/2
	20	7 x 20 1/4	7 x 24	7 x 27 3/4	9 x 27 3/4	9 x 30	20	7 x 22 1/2	7 x 27 3/4	9 x 27 3/4	9 x 30 3/4	9 x 33 3/4	22	7 x 25 1/2	9 x 27	9 x 31 1/2	9 x 35 1/4	11 x 35 1/2
	12	5 1/4 x 16 1/2	5 1/4 x 20 1/4	7 x 19 1/2	7 x 24	9 x 23 1/4	12	5 1/4 x 19 1/2	7 x 21	7 x 23 1/4	7 x 25 1/2	9 x 25 1/2	14	7 x 19 1/2	7 x 24 3/4	7 x 27 3/4	9 x 27 3/4	9 x 32 1/2
	14	5 1/4 x 18 3/4	7 x 19 1/2	7 x 21 3/4	7 x 24 3/4	9 x 24	14	5 1/4 x 21	7 x 22 1/2	7 x 25 1/2	7 x 27 3/4	9 x 27	16	7 x 21 3/4	7 x 27	9 x 27	9 x 29 1/4	9 x 33
	16	5 1/4 x 20 1/4	7 x 21	7 x 24	7 x 26 1/4	9 x 25 1/2	16	7 x 19 1/2	7 x 24	7 x 27 3/4	9 x 27	9 x 30	18	7 x 23 1/4	9 x 24 3/4	9 x 28 1/2	9 x 31 1/2	9 x 34 1/2
	18	5 1/4 x 21	7 x 21 3/4	7 x 25 1/2	9 x 24 3/4	9 x 27 3/4	18	7 x 21	7 x 25 1/2	9 x 25 1/2	9 x 29 1/4	9 x 31 1/2	20	7 x 24 3/4	9 x 26 1/4	9 x 30	9 x 33 3/4	9 x 36
	20	5 1/4 x 21 3/4	7 x 22 1/2	7 x 27 3/4	9 x 27	9 x 29 1/4	20	7 x 21 3/4	7 x 27	9 x 26 1/4	9 x 30 3/4	9 x 33	22	7 x 26 1/4	9 x 27	9 x 30 3/4	9 x 35 1/4	11 x 33 3/4
	12	5 1/4 x 16 1/2	5 1/4 x 20 1/4	7 x 19 1/2	7 x 21 3/4	7 x 24	12	5 1/4 x 19 1/2	7 x 19 1/2	7 x 23 1/4	7 x 24 3/4	9 x 24	14	7 x 18 3/4	7 x 23 1/4	7 x 27	9 x 26 1/4	9 x 28 1/2
	14	5 1/4 x 18	7 x 18 3/4	7 x 21	7 x 24	7 x 26 1/4	14	5 1/4 x 20 1/4	7 x 21 3/4	7 x 24 3/4	7 x 27 3/4	9 x 27	16	7 x 20 1/4	7 x 24 3/4	9 x 25 1/2	9 x 28 1/2	9 x 30 3/4
	16	5 1/4 x 19 1/2	7 x 20 1/4	7 x 23 1/4	7 x 26 1/4	9 x 24 3/4	16	7 x 19 1/2	7 x 23 1/4	7 x 27	9 x 26 1/4	9 x 29 1/4	18	7 x 21 3/4	7 x 26 1/4	9 x 27	9 x 30	9 x 32 1/2
	18	5 1/4 x 21	7 x 21 3/4	7 x 24 3/4	7 x 27 3/4	9 x 26 1/4	18	7 x 20 1/4	7 x 24 3/4	9 x 25 1/2	9 x 27 3/4	9 x 30 3/4	20	7 x 23 1/4	9 x 24 3/4	9 x 27 3/4	9 x 31 1/2	9 x 34 1/2
	20	5 1/4 x 21 3/4	7 x 22 1/2	7 x 26 1/4	7 x 29 1/4	9 x 27 3/4	20	7 x 21	7 x 25 1/2	9 x 26 1/4	9 x 29 1/4	9 x 32 1/4	22	7 x 24 3/4	9 x 25 1/2	9 x 29 1/4	9 x 33	9 x 36
	12	5 1/4 x 17 1/4	5 1/4 x 20 1/4	7 x 20 1/4	7 x 21 3/4	7 x 24	12	5 1/4 x 19 1/2	7 x 19 1/2	7 x 23 1/4	7 x 24 3/4	9 x 24	14	7 x 19 1/2	7 x 23 1/4	7 x 27	9 x 26 1/4	9 x 28 1/2
	14	5 1/4 x 18 3/4	7 x 19 1/2	7 x 21 3/4	7 x 24 3/4	7 x 27	14	5 1/4 x 21	7 x 21 3/4	7 x 24 3/4	7 x 27 3/4	9 x 27	16	7 x 20 1/4	7 x 24 3/4	9 x 25 1/2	9 x 28 1/2	9 x 30 3/4
	16	5 1/4 x 19 1/2	7 x 20 1/4	7 x 23 1/4	7 x 26 1/4	9 x 25 1/2	16	7 x 19 1/2	7 x 23 1/4	7 x 27	9 x 26 1/4	9 x 29 1/4	18	7 x 21 3/4	7 x 26 1/4	9 x 27	9 x 30	9 x 32 1/2
	18	5 1/4 x 20 1/4	7 x 21 3/4	7 x 24 3/4	7 x 27 3/4	9 x 27	18	7 x 20 1/4	7 x 24 3/4	9 x 24 3/4	9 x 27 3/4	9 x 30 3/4	20	7 x 22 1/2	7 x 27 3/4	9 x 28 1/2	9 x 31 1/2	9 x 33 3/4
	20	5 1/4 x 20 1/4	7 x 22 1/2	7 x 26 1/4	7 x 29 1/4	9 x 28 1/2	20	7 x 21	7 x 25 1/2	9 x 26 1/4	9 x 29 1/4	9 x 31 1/2	22	7 x 23 1/4	9 x 25 1/2	9 x 29 1/4	9 x 32 1/4	9 x 35 1/2
	12	5 1/4 x 15 3/4	5 1/4 x 19 1/2	7 x 19 1/2	7 x 21 3/4	7 x 23 1/4	12	5 1/4 x 18 3/4	7 x 19 1/2	7 x 22 1/2	7 x 25 1/2	9 x 23 1/4	14	5 1/4 x 21	7 x 22 1/2	7 x 26 1/4	9 x 25 1/2	9 x 27 3/4
	14	5 1/4 x 17 1/4	5 1/4 x 21	7 x 21	7 x 23 3/4	7 x 25 1/2	14	5 1/4 x 20 1/4	7 x 21	7 x 24	7 x 27	9 x 25 1/2	16	7 x 20 1/4	7 x 24	7 x 27 3/4	9 x 27	9 x 30
	16	5 1/4 x 18	7 x 19 1/2	7 x 22 1/2	7 x 24 3/4	7 x 27	16	5 1/4 x 21	7 x 22 1/2	7 x 25 1/2	9 x 25 1/2	9 x 27 3/4	18	7 x 21	7 x 25 1/2	9 x 25 1/2	9 x 29 1/4	9 x 31 1/2
	18	5 1/4 x 19 1/2	7 x 20 1/4	7 x 23 1/4	7 x 26 1/4	9 x 25 1/2	18	7 x 19 1/2	7 x 23 1/4	7 x 27	9 x 27	9 x 29 1/4	20	7 x 21 3/4	7 x 27	9 x 27	9 x 30	9 x 33
	20	5 1/4 x 20 1/4	7 x 21	7 x 24 3/4	7 x 27 3/4	9 x 26 1/4	20	7 x 20 1/4	7 x 24 3/4	9 x 24 3/4	9 x 27 3/4	9 x 30 3/4	22	7 x 23 1/4	9 x 24 3/4	9 x 27 3/4	9 x 31 1/2	9 x 34 1/2

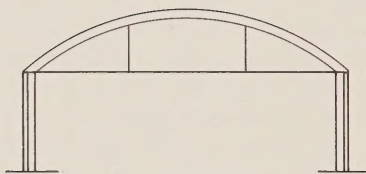
Note: All sections shown are dictated by vertical loadings. On slopes steeper than 10:12, wind load may govern.

Timber Structures two-hinged arches. Sometimes called the barrel arch, this structural unit is adaptable for wide spans. They have been used for spans up to 250 feet, and are practical for even wider spaces. Two-hinged arches are of three types: foundation, tied and buttressed. With foundation arches the horizontal thrust is contained by foundation piers with or without tie rods beneath the floor. Tied arches are supported by columns or bearing walls, with additional headroom, if desired, being obtained by elevating the tie rods. Horizontal thrust of buttressed arches is contained by concrete buttresses. Soil conditions and height of buttresses are determining factors as to fitness and cost.

TWO-HINGED (BARREL) ARCHES



Foundation arch



Tied arch



Buttressed arch

GYMNASIUM, SOUTHEAST JUNIOR-SENIOR HIGH SCHOOL, Pine Bluff, Arkansas is 74' x 129' in size. Foundation arches are spaced at 16 feet, and extend 13 feet beyond the sidewalls which are 14'-7" high. Center height is 25'-5".

Architects: Caudill, Rowlett, Scott and Associates, Oklahoma City, Oklahoma, and Reed and Willis of Pine Bluff, Arkansas.

Contractor: Davis Quinn and Sons, Pine Bluff, Arkansas.

PENN FRUIT COMPANY, Philadelphia, uses 100-foot tied arches spaced at 20 feet to support the roof over this modern supermarket. Tie rods support lighting fixtures as well as contain the horizontal thrust.

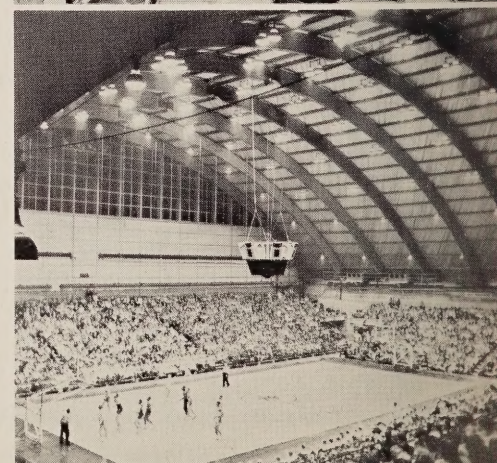
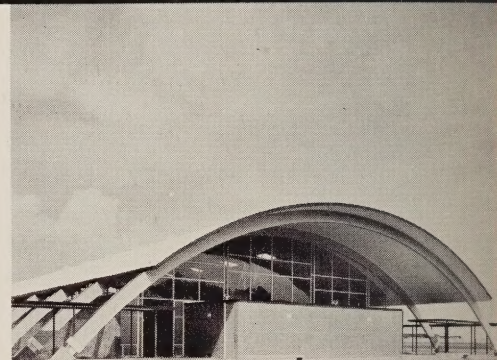
Architects: Thalheimer & Weitz, Philadelphia.

Contractor: United Building Construction Company, Philadelphia.

MONTANA STATE UNIVERSITY FIELD HOUSE, Missoula, Montana, has arena of 200' x 180' with post-free space provided by 200-foot glulam arches spaced at 20 feet and resting upon 26-foot buttressed walls. Center of arches is 70 feet above the arena floor.

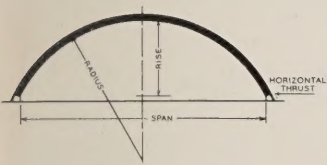
Architects: Brinkman and Lenon, Kalispell, Montana.

Contractor: Hightower & Lubrecht Co., Missoula, Montana.





TWO-HINGED (BARREL) ARCHES



FOUNDATION ARCHES (rise equals $\frac{1}{3}$ of span)

SPAN	RISE	RADIUS	SECTION SIZES REQUIRED IN INCHES					MAXIMUM HORIZONTAL THRUST per 100 lbs. of Design Load
			Design Load on Horizontal Projection, in Pounds per Lineal Foot of Arch Span					
			400	600	800	1,000	1,200	
50'	16'-8"	27'-1"	DEPTH INCREMENTS BASED ON 3/4" LAMINATIONS					1,750 lbs.
			3 1/4 x 13 1/2	5 1/4 x 12 3/4	5 1/4 x 15	5 1/4 x 16 1/2	5 1/4 x 18	
60'	20'-8"	32'-6"	DEPTH INCREMENTS BASED ON 1 3/8" LAMINATIONS					2,100 lbs.
			5 1/4 x 13 3/4	5 1/4 x 16 1/2	5 1/4 x 19 1/4	5 1/4 x 20 5/8	5 1/4 x 22	
70'	23'-4"	37'-11"	5 1/4 x 16 1/2	5 1/4 x 19 1/4	5 1/4 x 20 5/8	5 1/4 x 23 3/8	7 x 22	2,450 lbs.
80'	26'-8"	43'-3"	DEPTH INCREMENTS BASED ON 1 5/8" LAMINATIONS					2,800 lbs.
			5 1/4 x 17 7/8	5 1/4 x 22 3/4	7 x 22 3/4	7 x 24 3/8	7 x 24 3/8	
90'	30'-0"	48'-9"	5 1/4 x 21 1/8	7 x 22 3/4	7 x 24 3/8	7 x 26	7 x 27 7/8	3,150 lbs.
100'	33'-4"	54'-2"	5 1/4 x 22 3/4	7 x 24 3/8	7 x 26	7 x 29 1/4	7 x 30 7/8	3,500 lbs.
110'	36'-8"	59'-7"	7 x 22 3/4	7 x 26	7 x 29 1/4	7 x 32 1/2	9 x 30 7/8	3,850 lbs.
120'	40'-0"	65'-0"	7 x 24 3/8	7 x 27 7/8	7 x 30 7/8	9 x 30 7/8	9 x 32 1/2	4,200 lbs.
130'	43'-4"	70'-5"	7 x 26	7 x 29 1/4	9 x 30 7/8	9 x 34 1/8	9 x 35 3/4	4,550 lbs.
140'	46'-8"	75'-10"	7 x 27 7/8	7 x 32 1/2	9 x 34 1/8	9 x 35 3/4	9 x 39	4,900 lbs.
150'	50'-0"	81'-3"	7 x 29 1/4	9 x 30 7/8	9 x 35 3/4	11 x 35 3/4	11 x 39	5,250 lbs.
160'	53'-4"	86'-8"	9 x 27 7/8	9 x 32 1/2	9 x 37 7/8	11 x 39	11 x 40 3/8	5,600 lbs.
170'	56'-8"	92'-1"	9 x 29 1/4	9 x 35 3/8	9 x 39	11 x 40 5/8	11 x 43 7/8	5,950 lbs.
180'	60'-0"	97'-6"	9 x 30 7/8	9 x 37 7/8	11 x 39	11 x 42 1/4	11 x 45 1/2	6,300 lbs.



TIED and BUTTRESSED ARCHES (radius equals span)

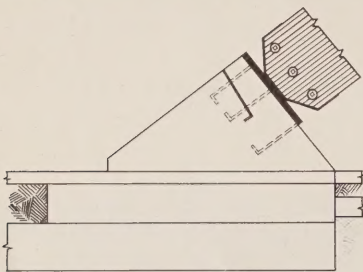


DEPTH INCREMENTS BASED ON $1\frac{5}{8}$ " LAMINATIONS

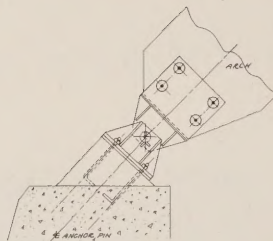
SPAN	RISE	SECTION SIZES REQUIRED IN INCHES					MAXIMUM HORIZONTAL THRUST per 100 lbs. of Design Load
		Design Load on Horizontal Projection, in Pounds per Lineal Foot of Arch Span					
		400	600	800	1,000	1,200	
50'	6'-8 $\frac{3}{8}$ "	3 $\frac{1}{4}$ x 11 $\frac{3}{8}$	3 $\frac{1}{4}$ x 13	5 $\frac{1}{4}$ x 13	5 $\frac{1}{4}$ x 14 $\frac{5}{8}$	5 $\frac{1}{4}$ x 14 $\frac{5}{8}$	4,700 lbs.
60'	8'-0 $\frac{7}{16}$ "	3 $\frac{1}{4}$ x 13	5 $\frac{1}{4}$ x 13	5 $\frac{1}{4}$ x 14 $\frac{5}{8}$	5 $\frac{1}{4}$ x 16 $\frac{1}{4}$	5 $\frac{1}{4}$ x 17 $\frac{7}{8}$	5,640 lbs.
70'	9'-4 $\frac{1}{16}$ "	5 $\frac{1}{4}$ x 13	5 $\frac{1}{4}$ x 16 $\frac{1}{4}$	5 $\frac{1}{4}$ x 17 $\frac{7}{8}$	5 $\frac{1}{4}$ x 19 $\frac{1}{2}$	5 $\frac{1}{4}$ x 21 $\frac{1}{8}$	6,580 lbs.
80'	10'-8 $\frac{5}{8}$ "	5 $\frac{1}{4}$ x 14 $\frac{3}{8}$	5 $\frac{1}{4}$ x 17 $\frac{7}{8}$	5 $\frac{1}{4}$ x 19 $\frac{1}{2}$	5 $\frac{1}{4}$ x 21 $\frac{1}{8}$	5 $\frac{1}{4}$ x 22 $\frac{3}{4}$	7,520 lbs.
90'	12'-1 $\frac{1}{16}$ "	5 $\frac{1}{4}$ x 16 $\frac{1}{4}$	5 $\frac{1}{4}$ x 19 $\frac{1}{2}$	5 $\frac{1}{4}$ x 22 $\frac{3}{4}$	7 x 22 $\frac{3}{4}$	7 x 22 $\frac{3}{4}$	8,860 lbs.
100'	13'-4 $\frac{3}{4}$ "	5 $\frac{1}{4}$ x 19 $\frac{1}{2}$	5 $\frac{1}{4}$ x 22 $\frac{3}{4}$	7 x 22 $\frac{3}{4}$	7 x 24 $\frac{3}{8}$	7 x 24 $\frac{3}{8}$	9,400 lbs.
110'	14'-8 $\frac{7}{8}$ "	5 $\frac{1}{4}$ x 21 $\frac{1}{8}$	7 x 21 $\frac{1}{8}$	7 x 24 $\frac{3}{8}$	7 x 26	7 x 27 $\frac{5}{8}$	10,340 lbs.
120'	16'-0 $\frac{1}{16}$ "	5 $\frac{1}{4}$ x 22 $\frac{3}{4}$	7 x 24 $\frac{3}{8}$	7 x 26	7 x 27 $\frac{5}{8}$	7 x 29 $\frac{1}{4}$	11,280 lbs.

NOTE: These tables are based upon conservative design criteria for construction with suitable structural grade combinations, but are subject to local considerations. Normal lateral support is assumed. These tables supersede previous issues.

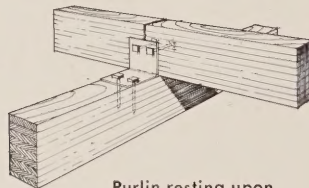
DETAILS



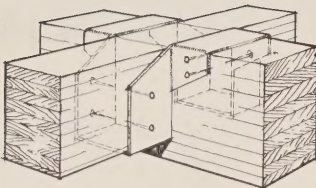
Typical foundation buttress with tie rods beneath floor.



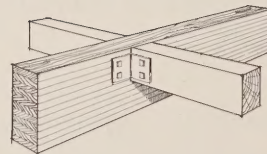
Hinged connection joins arch to buttress.



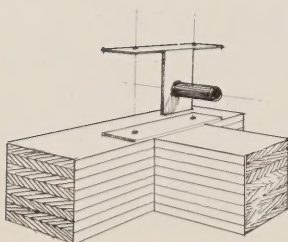
Purlin resting upon arch or girder.



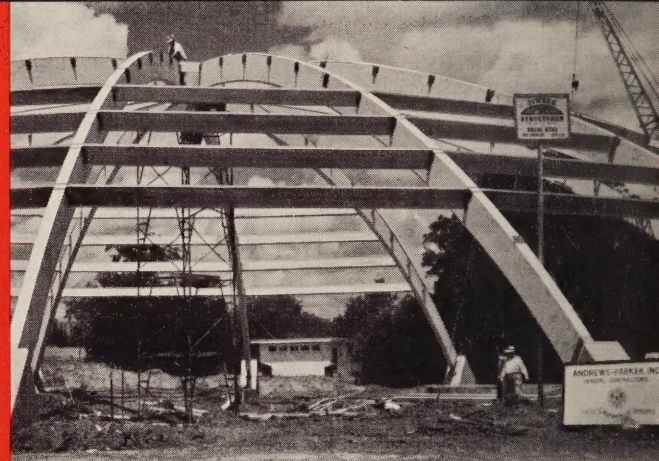
Flush type connection using purlin hangers.



Clip angle flush connection.



Concealed purlin connection.



AUDITORIUM, A & M HIGH SCHOOL, College Station, Texas uses sixteen radial ribs and ten concentric lines of timber purlins to frame the building. Diameter is 138 feet.

Architects: Caudill, Rowlett, Scott and Associates, Bryan, Texas; Oklahoma City, Oklahoma; Corning, N. Y.

Contractors: Andrews-Parker, Inc., Bryan, Texas.

STANDARD THICKNESSES OF LAMINATIONS AND LIMITING CURVATURES

These ratios of curvature are recommended as safe limits for Douglas Fir, within which the wood is not overstressed by the curvature. Cost of glued laminated curved members varies inversely to the thickness of laminations.

FOR MEMBERS OF TYPE 1— CONSTANT CURVATURE		FOR CURVED MEMBERS HAVING TYPE 2 — TANGENT ENDS	
			
Tapered Section	Constant Section	Tapered Section	Constant Section
MINIMUM RADIUS OF CURVATURE	NET THICKNESS OF LAMINATIONS	MINIMUM RADIUS OF CURVATURE	
(25") 2'- 1"	1/4" Special	(25") 2'-1"	
(40") 3'- 4"	5/16" Special	(36") 3'-0"	
(55") 4'- 7"	3/8" Special	(48") 4'-0"	
(86") 7'- 2"	1/2" Special	(72") 6'-0"	
(118") 9'-10"	5/8" Special	(92") 7'-8"	
(150") 12'- 6"	3/4" Standard	(112") 9'-4"	
(336") 28'- 0"	1 1/16" Special	(264") 22'-0"	
(480") 40'- 0"	1 5/8" Standard	(384") 32'-0"	

SECTION PROPERTIES OF GLUED LAMINATED MEMBERS with 1½" Laminations

$$A = \text{Area} = H \times W$$

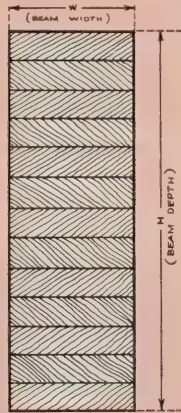
$$S = \text{Section Modulus}$$

$$= \frac{H^2 \times W}{6}$$

$$I = \text{Moment of Inertia}$$

$$= \frac{H^3 \times W}{12}$$

Note: Depth-to-breadth ratio of members to be in accordance with recommendations of National Design Specification.



No. Lams.	W Beam Width (In.)	H Beam Depth (In.)	A Area (In. ²)	S Section Modulus (In. ³)	I Moment of Inertia (In. ⁴)	Weight per Lineal Foot (Lbs.)
-----------	--------------------------	--------------------------	----------------------------------	---	---	---

3¼" WIDTH

2	3¼"	3½"	10.16	5.29	8.265	2.40
3	3¼"	4¾"	15.44	12.22	29.02	3.64
4	3¼"	6¾"	20.72	22.02	70.16	4.89
5	3¼"	8"	26.00	34.67	138.6	6.14
6	3¼"	9¾"	31.28	50.18	241.5	7.39
7	3¼"	11¼"	36.56	68.56	385.6	8.64
8	3¼"	12¾"	41.84	89.80	578.0	9.89
9	3¼"	14½"	47.13	113.9	825.6	11.14
10	3¼"	16½"	52.41	140.9	1,135.0	12.39
11	3¼"	17¾"	57.69	170.7	1,514.0	13.64
12	3¼"	19¾"	62.97	203.3	1,970.0	14.89
13	3¼"	21"	68.25	238.9	2,508.0	16.14
14	3¼"	22¾"	73.53	277.3	3,136.0	17.39

5¼" WIDTH

5	5¼"	8"	42.00	56.00	224.0	9.92
6	5¼"	9¾"	50.53	81.06	390.1	11.93
7	5¼"	11¼"	59.06	110.7	622.9	13.94
8	5¼"	12¾"	67.59	145.0	933.8	15.96
9	5¼"	14½"	76.13	184.0	1,334.0	17.97
10	5¼"	16½"	84.66	227.5	1,834.0	19.99
11	5¼"	17¾"	93.19	257.7	2,447.0	22.00
12	5¼"	19¾"	101.7	328.5	3,182.0	24.01
13	5¼"	21"	110.3	385.9	4,052.0	26.03
14	5¼"	22¾"	118.8	447.9	5,067.0	28.04
15	5¼"	24¼"	127.3	514.6	6,239.0	30.06
16	5¼"	25¾"	135.8	585.8	7,579.0	32.07
17	5¼"	27½"	144.4	661.7	9,099.0	34.08
18	5¼"	29½"	152.9	742.2	10,809.0	36.10
19	5¼"	30¾"	161.4	827.4	12,720.0	38.11
20	5¼"	32¾"	170.0	917.1	14,850.0	40.13
21	5¼"	34"	178.5	1,012.0	17,196.0	42.15
22	5¼"	35¾"	187.0	1,110.5	18,780.0	44.17
23	5¼"	37¼"	195.6	1,214.0	20,613.0	46.18

7" WIDTH

5	7"	8"	56.00	74.69	298.6	13.22
6	7"	9¾"	67.38	108.1	520.1	15.91
7	7"	11¼"	78.75	147.7	830.5	18.59
8	7"	12¾"	90.13	193.5	1,245.0	21.28
9	7"	14½"	101.5	245.4	1,778.0	23.96
10	7"	16½"	112.9	303.4	2,446.0	26.65
11	7"	17¾"	124.3	367.7	3,262.0	29.33
12	7"	19¾"	135.6	438.1	4,242.0	32.02
13	7"	21"	147.0	514.6	5,402.0	34.70
14	7"	22¾"	158.4	597.4	6,756.0	37.39
15	7"	24¼"	169.8	686.3	8,318.0	40.08
16	7"	25¾"	181.1	781.3	10,110.0	42.76
17	7"	27½"	192.5	882.5	12,130.0	45.45

No. Lams.	W Beam Width (In.)	H Beam Depth (In.)	A Area (In. ²)	S Section Modulus (In. ³)	I Moment of Inertia (In. ⁴)	Weight per Lineal Foot (Lbs.)
-----------	--------------------------	--------------------------	----------------------------------	---	---	---

7" WIDTH (Cont.)

18	7"	29½"	203.9	989.9	14,410.0	48.13
19	7"	30¾"	215.3	1,103.0	16,960.0	50.82
20	7"	32¾"	226.6	1,223.0	19,790.0	53.50
21	7"	34"	238.0	1,349.0	22,930.0	56.19
22	7"	35¾"	249.4	1,481.0	26,370.0	58.87
23	7"	37¼"	260.8	1,619.0	30,150.0	61.56
24	7"	38¾"	272.1	1,764.0	34,270.0	64.24
25	7"	40½"	283.5	1,914.0	38,750.0	66.93
26	7"	42½"	294.9	2,071.0	43,600.0	69.61
27	7"	43¾"	306.3	2,234.0	48,850.0	72.30
28	7"	45¾"	317.6	2,403.0	54,490.0	74.98
29	7"	47"	329.0	2,578.0	60,560.0	77.67
30	7"	48¾"	340.4	2,759.0	67,060.0	80.35
31	7"	50¼"	351.8	2,947.0	74,012.0	83.05

9" WIDTH

6	9"	9¾"	86.63	139.0	668.75	20.45
7	9"	11¼"	101.25	189.8	1,067.9	23.91
8	9"	12¾"	115.88	248.7	1,600.6	27.36
9	9"	14½"	130.5	315.4	2,285.5	30.81
10	9"	16½"	145.13	390.0	3,144.6	34.27
11	9"	17¾"	159.75	472.6	4,192.0	37.72
12	9"	19¾"	174.38	563.1	5,454.7	41.17
13	9"	21"	189.0	661.5	6,945.8	44.63
14	9"	22¾"	203.6	767.8	8,686.0	48.08
15	9"	24¼"	218.3	882.1	10,695.0	51.53
16	9"	25¾"	232.88	1,004.0	12,992.5	54.99
17	9"	27½"	247.5	1,134.0	15,598.0	58.44
18	9"	29½"	262.13	1,272.0	18,530.0	61.89
19	9"	30¾"	276.75	1,418.0	21,807.0	65.35
20	9"	32¾"	291.4	1,572.0	25,450.0	68.80
21	9"	34"	306.0	1,734.0	29,478.0	72.25
22	9"	35¾"	320.6	1,904.0	33,909.0	75.71
23	9"	37¼"	335.3	2,081.0	38,765.0	79.16
24	9"	38¾"	349.9	2,267.0	44,063.0	82.61
25	9"	40½"	364.5	2,460.0	49,823.0	86.07
26	9"	42½"	379.1	2,662.0	56,061.0	89.52
27	9"	43¾"	393.8	2,871.0	62,805.0	92.97
28	9"	45¾"	408.4	3,088.0	70,067.0	96.43
29	9"	47"	423.0	3,314.0	77,867.0	99.88
30	9"	48¾"	437.6	3,547.0	86,227.0	103.33
31	9"	50¼"	452.3	3,788.0	95,163.0	106.79
32	9"	51¾"	466.9	4,037.0	104,697.0	110.24
33	9"	53¼"	481.5	4,293.0	114,848.0	113.69
34	9"	55½"	496.1	4,558.0	125,634.0	117.14
35	9"	56¾"	510.8	4,831.0	137,175.0	120.60
36	9"	58¾"	525.4	5,111.0	149,191.0	124.05
37	9"	60"	540.0	5,400.0	162,000.0	127.50
38	9"	61¾"	554.7	5,696.0	175,520.0	130.96
39	9"	63¼"	569.3	6,001.0	189,777.0	134.41

11" WIDTH

7	11"	11¼"	123.75	232.0	1,305.0	29.22
8	11"	12¾"	141.6	303.9	1,957.0	33.44
9	11"	14½"	159.5	385.4	2,795.0	37.66
10	11"	16½"	177.4	476.6	3,844.0	41.88
11	11"	17¾"	195.25	577.5	5,126.0	46.10
12	11"	19¾"	213.13	688.1	6,667.0	50.32
13	11"	21"	231.0	808.4	8,490.0	54.54
14	11"	22¾"	248.9	938.3	10,617.0	58.76
15	11"	24¼"	266.8	1,078.0	13,072.0	62.98
16	11"	25¾"	284.6	1,227.0	15,880.0	67.20
17	11"	27½"	302.5	1,386.0	19,065.0	71.42
18	11"	29½"	320.4	1,555.0	22,648.0	75.64
19	11"	30¾"	338.3	1,733.0	26,665.0	79.86
20	11"	32¾"	356.13	1,921.0	31,108.0	84.08
21	11"	34"	374.0	2,119.0	36,030.0	88.30
22	11"	35¾"	391.9	2,326.0	41,445.0	92.52
23	11"	37¼"	409.8	2,543.0	47,380.0	96.75
24	11"	38¾"	427.6	2,770.0	53,856.0	100.96
25	11"	40½"	445.5	3,007.0	60,896.0	105.19
26	11"	42½"	463.4	3,253.0	68,522.0	109.41
27	11"	43¾"	481.3	3,509.0	76,764.0	113.63

No. Lams.	W Beam Width (In.)	H Beam Depth (In.)	A Area (In. ²)	S Section Modulus (In. ³)	I Moment of Inertia (In. ⁴)	Weight per Lineal Foot (Lbs.)
-----------	--------------------------	--------------------------	----------------------------------	---	---	---

11" WIDTH (Cont.)

28	11"	45¾"	499.1	3,774.0	85,640.0	117.85
29	11"	47"	517.0	4,049.0	95,175.0	122.07
30	11"	48¾"	534.9	4,334.0	105,392.0	126.29
31	11"	50¼"	552.8	4,629.0	116,315.0	130.51
32	11"	51¾"	570.6	4,933.0	127,968.0	134.73
33	11"	53½"	588.5	5,247.0	140,374.0	138.95
34	11"	55½"	606.4	5,570.0	153,558.0	143.17
35	11"	56¾"	624.3	5,903.0	167,543.0	147.39
36	11"	58¾"	642.1	6,246.0	182,350.0	151.61
37	11"	60"	660.0	6,599.0	198,007.0	155.83
38	11"	61¾"	677.9	6,961.0	214,533.0	160.05
39	11"	63¼"	695.8	7,333.0	231,958.0	164.27
40	11"	64¾"	713.6	7,715.0	250,299.0	168.49
41	11"	66½"	731.5	8,106.0	269,583.0	172.71
42	11"	68½"	749.4	8,505.0	289,831.0	176.93
43	11"	69¾"	767.3	8,918.0	311,071.0	181.15
44	11"	71¾"	785.1	9,338.0	333,323.0	185.37
45	11"	73"	803.0	9,768.0	356,612.0	189.59
46	11"	74¾"	820.9	10,208.0	380,961.0	193.81
47	11"	76¼"	838.8	10,657.0	406,393.0	198.03
48	11"	77¾"	856.7	11,116.0	432,933.0	202.26

12½" WIDTH

8	12½"	12¾	160.9	345.3	2,223.0	38.00
9	12½"	14½	181.3	438.0	3,176.0	42.79
10	12½"	16½	201.6	541.7	4,368.0	47.59
11	12½"	17¾	221.9	656.4	5,825.0	52.38
12	12½"	19¾	242.2	782.0	7,576.0	57.18
13	12½"	21"	262.5	918.7	9,647.0	61.97
14	12½"	22½	282.8	1,066.0	12,064.0	66.77
15	12½"	24¼	303.1	1,225.0	14,855.0	71.56
16	12½"	25¾	323.4	1,395.0	18,046.0	76.36
17	12½"	27½	343.8	1,575.0	21,664.0	81.15
18	12½"	29½	364.1	1,767.0	25,736.0	85.95
19	12½"	30¾	384.4	1,970.0	30,288.0	90.74
20	12½"	32¾	404.7	2,184.0	35,350.0	95.54
21	12½"	34"	425.0	2,408.0	40,943.0	100.33
22	12½"	35¾	445.3	2,644.0	47,097.0	105.13
23	12½"	37¼	465.6	2,891.0	53,842.0	109.92
24	12½"	38¾	485.9	3,148.0	61,200.0	114.72
25	12½"	40½	506.3	3,417.0	69,200.0	119.51
26	12½"	42½	526.6	3,697.0	77,866.0	124.31
27	12½"	43¾	546.9	3,988.0	87,232.0	129.10
28	12½"	45¾	567.2	4,289.0	97,318.0	133.90
29	12½"	47"	587.5	4,602.0	108,152.0	138.69
30	12½"	48¾	607.8	4,926.0	119,763.0	143.49
31	12½"	50¼	628.1	5,261.0	132,175.0	148.28
32	12½"	51¾	748.4	5,606.0	154,417.0	153.08
33	12½"	53½	668.8	5,963.0	159,516.0	157.87
34	12½"	55½	689.1	6,331.0	174,497.0	162.67
35	12½"	56¾	709.4	6,709.0	190,388.0	167.46
36	12½"	58¾	729.7	7,099.0	207,216.0	172.26
37	12½"	60"	750.0	7,500.0	225,007.0	177.05
38	12½"	61¾	770.3	7,912.0	243,786.0	181.85
39	12½"	63¼	790.6	8,334.0	263,587.0	186.64
40	12½"	64¾	810.9	8,768.0	284,429.0	191.44
41	12½"	66½	831.3	9,213.0	306,342.0	196.23
42	12½"	68½	851.6	9,669.0	329,353.0	201.03
43	12½"	69¾	871.9	10,140.0	353,485.0	205.82
44	12½"	71¾	892.2	10,613.0	378,775.0	210.62
45	12½"	73"	912.5	11,102.0	405,239.0	215.41
46	12½"	74¾	932.8	11,602.0	432,909.0	220.21
47	12½"	76¼	953.1	12,112.0	461,809.0	225.00
48	12½"	77¾	973.4	12,634.0	491,967.0	229.80
49	12½"	79½	993.8	13,167.0	523,413.0	234.59
50	12½"	81½	1,014.0	13,710.0	556,169.0	239.39
51	12½"	82¾	1,034.0	14,270.0	590,264.0	244.18
52	12½"	84¾	1,056.0	14,831.0	625,726.0	248.98
53	12½"	86"	1,075.0	15,408.0	662,580.0	253.77
54	12½"	87¾	1,095.0	16,000.0	700,853.0	258.57
55	12½"	89¼	1,116.0	16,590.0	740,572.0	263.36
56	12½"	90¾	1,136.0	17,204.0	781,765.0	268.15
57	12½"	92½	1,156.0	17,825.0	824,457.0	272.93

Timber Structures rigid frames. Engineering experience and resourcefulness of the Timber Structures staff is responsible for the rigid frame. This unit provides the economical method of achieving low pitched roofs while maintaining desired clearances, accomplishing the same results as the low rise 3-hinged arch without the radius at the haunch. Each half bent is composed of separate leg and arm members, precision fabricated and joined by a patented haunch connection that maintains the correct roof slope under design loads. The rigid frame, by separating the leg and arm members, facilitates shipping so that spans up to 100 feet or more are easily delivered to any jobsite in the nation.

GLUED LAMINATED RIGID FRAMES

BREEZY POINT SURF CLUB, Rockaway Point, New York has an attractive pavilion framed by five glulam rigid frames of 53'-6" span, spaced at 17 feet. Roof slope is 2:12.

Architects: Adams and Woodbridge, New York City.

Contractor: Rockaway Point Development Corp.

VALPARAISO UNIVERSITY STUDENT UNION BUILDING, Valparaiso, Indiana uses 21 rigid frames of 53-foot span to frame the main lounge. Frames are 7 feet high at the wall and 18'-8½" at the peak.

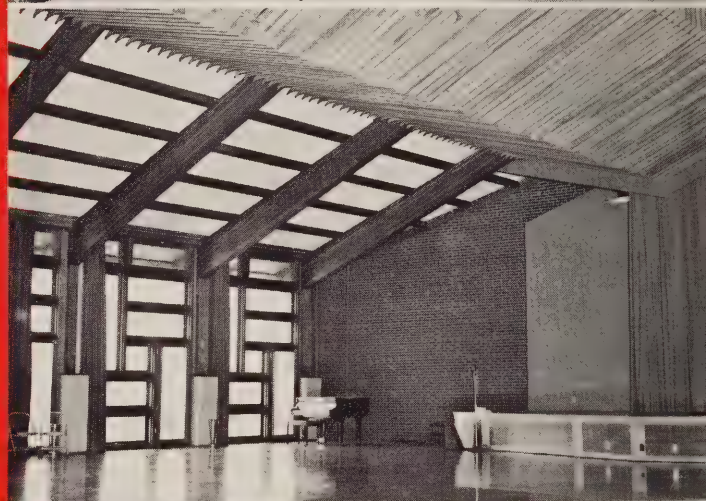
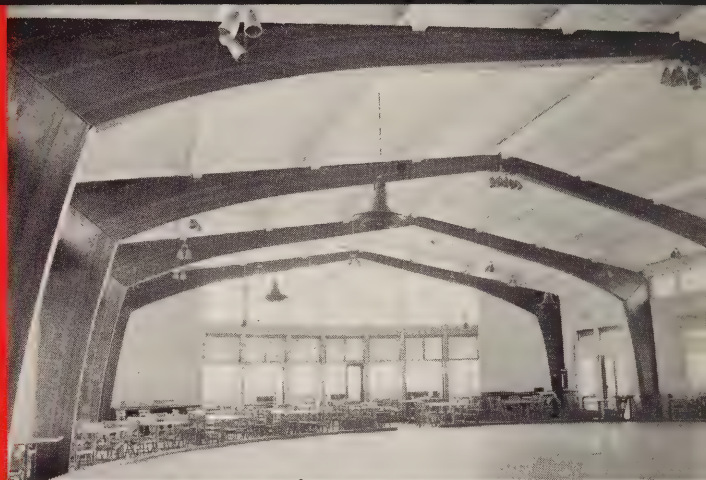
Architects: Hare and Hatch, New York City.

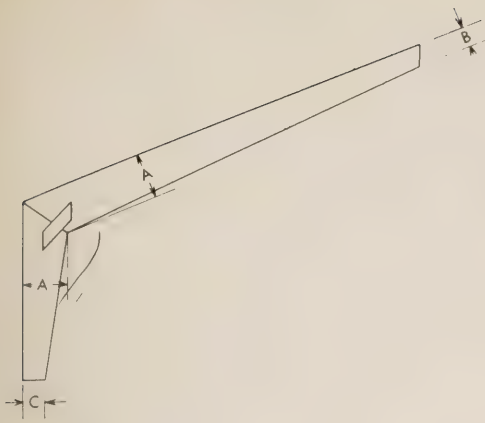
Contractor: E. W. Sproul Construction Co., Chicago.

CONGREGATION SHAAKIE TORAH, Portland, Oregon will seat 400 worshippers in the nave, 280 in the balcony and 250 in the fellowship hall at the rear of the nave. Rigid frames of 71'-9¼" span are placed at an angle from the sidewalls and meet at the peak 32'-6" above the floor.

Architects: Jensen & Gilham, Portland, Oregon.

Contractors: Teeple and Thatcher, Portland, Oregon.





RIGID FRAME DIMENSIONS (3-hinge design)

ROOF SLOPE 3:12

SPAN	LOADING PER LINEAL FOOT	LEG HEIGHT	DIMENSION		
			A	B	C
40'	600 LBS.	12'	7" x 19 1/2"	10"	10"
		16'	7" x 21 1/8"	10"	11"
		20'	7" x 21 1/8"	10"	11"
	800 LBS.	12'	7" x 22 3/4"	10"	11"
		16'	7" x 24 3/8"	10"	12"
		20'	7" x 24 3/8"	10"	12"
	1,000 LBS.	12'	7" x 26"	10"	14"
		16'	7" x 27 5/8"	10"	14"
		20'	7" x 27 5/8"	10"	14"
50'	600 LBS.	12'	7" x 24 3/8"	10"	12"
		16'	7" x 26"	10"	13"
		20'	7" x 26"	10"	13"
	800 LBS.	12'	7" x 27 5/8"	10"	16"
		16'	7" x 29 1/4"	10"	15"
		20'	9" x 26"	12"	13"
	1,000 LBS.	12'	9" x 27 5/8"	12"	16"
		16'	9" x 29 1/4"	12"	15"
		20'	9" x 29 1/4"	12"	15"
60'	600 LBS.	12'	7" x 27 5/8"	10"	16"
		16'	7" x 29 1/4"	10"	15"
		20'	9" x 26"	12"	13"
	800 LBS.	12'	9" x 27 5/8"	12"	16"
		16'	9" x 29 1/4"	12"	15"
		20'	9" x 30 7/8"	12"	15"
	1,000 LBS.	12'	9" x 30 7/8"	12"	20"
		16'	9" x 34 1/8"	12"	17"
		20'	9" x 34 1/8"	12"	17"
70'	600 LBS.	12'	9" x 27 5/8"	12"	16"
		16'	9" x 30 7/8"	12"	15"
		20'	9" x 30 7/8"	12"	15"
	800 LBS.	12'	9" x 32 1/2"	12"	21"
		16'	9" x 34 1/8"	12"	18"
		20'	9" x 35 3/4"	12"	18"
	1,000 LBS.	12'	9" x 35 3/4"	12"	26"
		16'	9" x 39"	12"	22"
		20'	11" x 35 3/4"	14"	18"
80'	600 LBS.	12'	9" x 30 7/8"	12"	20"
		16'	9" x 32 1/2"	12"	17"
		20'	9" x 34 1/8"	12"	17"
	800 LBS.	12'	9" x 35 3/4"	12"	25"
		16'	11" x 34 1/8"	14"	18"
		20'	11" x 35 3/4"	14"	18"
	1,000 LBS.	12'	11" x 35 3/4"	14"	26"
		16'	11" x 39"	14"	23"
		20'	11" x 40 5/8"	14"	20"

ROOF SLOPE 6:12

SPAN	LOADING PER LINEAL FOOT	LEG HEIGHT	DIMENSION		
			A	B	C
40'	600 LBS.	12'	5 1/4" x 19 1/2"	8"	10"
		16'	5 1/4" x 21 1/8"	8"	10"
		20'	7" x 19 1/2"	10"	10"
	800 LBS.	12'	7" x 19 1/2"	10"	10"
		16'	7" x 21 1/8"	10"	11"
		20'	7" x 22 3/4"	10"	11"
	1,000 LBS.	12'	7" x 21 1/8"	10"	11"
		16'	7" x 24 3/8"	10"	12"
		20'	7" x 26"	10"	13"
50'	600 LBS.	12'	7" x 21 1/8"	10"	11"
		16'	7" x 22 3/4"	10"	11"
		20'	7" x 22 3/4"	10"	11"
	800 LBS.	12'	7" x 22 3/4"	10"	12"
		16'	7" x 26"	10"	13"
		20'	7" x 26"	10"	13"
	1,000 LBS.	12'	7" x 26"	10"	15"
		16'	7" x 29 1/4"	10"	15"
		20'	7" x 29 1/4"	10"	15"
60'	600 LBS.	12'	7" x 22 3/4"	10"	12"
		16'	7" x 24 3/8"	10"	12"
		20'	7" x 27 5/8"	10"	14"
	800 LBS.	12'	7" x 27 5/8"	10"	16"
		16'	7" x 29 1/4"	10"	15"
		20'	9" x 27 5/8"	12"	14"
	1,000 LBS.	12'	7" x 29 1/4"	10"	19"
		16'	9" x 27 5/8"	12"	14"
		20'	9" x 30 7/8"	12"	15"
70'	600 LBS.	12'	7" x 26"	10"	14"
		16'	7" x 27 5/8"	10"	14"
		20'	9" x 26"	12"	13"
	800 LBS.	12'	7" x 29 1/4"	10"	19"
		16'	9" x 27 5/8"	12"	14"
		20'	9" x 30 7/8"	12"	15"
	1,000 LBS.	12'	9" x 29 1/4"	12"	19"
		16'	9" x 32 1/2"	12"	16"
		20'	9" x 34 1/8"	12"	17"
80'	600 LBS.	12'	7" x 29 1/4"	10"	17"
		16'	9" x 27 5/8"	12"	14"
		20'	9" x 29 1/4"	12"	15"
	800 LBS.	12'	9" x 29 1/4"	12"	18"
		16'	9" x 32 1/2"	12"	16"
		20'	9" x 34 1/8"	12"	17"
	1,000 LBS.	12'	9" x 32 1/2"	12"	22"
		16'	9" x 35 3/4"	12"	20"
		20'	11" x 34 1/8"	14"	17"

Timber Structures beams and purlins. Beam construction of wide span buildings frequently is simplest and most economical. Wall height and cubage are reduced to a minimum, and both initial cost and expense of heating and cooling are among the lowest. Cantilevered beams and purlins provide large clear span areas with members of smaller section than those of simple beams. By extending beams beyond the side walls, framing for economical canopies is obtained. During lamination any desired camber may be introduced. By tapering the ends of cambered beams, framing for moderately pitched roofs is provided.

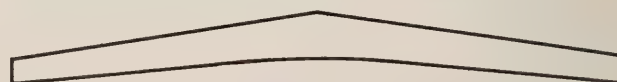
GLUED LAMINATED BEAMS AND PURLINS



Butterfly beam



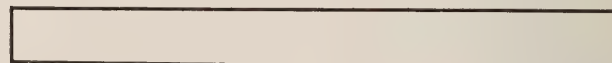
Peaked beam



Peaked and cambered beam



Tapered for slight roof slope



Simple beam with support at each end



FONTANA JUNIOR HIGH SCHOOL, Fontana, California. This light, cheerful classroom is typical of the attractive school rooms achieved with framing of glulam beams. Spaced at 10 feet, the beams extend beyond the walls to provide wide overhangs.

Architects: Jay Dewey Harnisch and Eugene Weldon Fickes, Jr., Ontario, California.

Contractors: Hoefer Construction Company, Fontana, California.



PUBLIC LIBRARY, Palatine, Illinois is 39'-4" x 60'-6" in size, with roof framed by four 39-foot peaked and cambered beams spaced at 12 feet. Striated Tim-Deck is applied over the beams which are finished to harmonize with furnishings.

Architects: Nicol and Nicol, Chicago.

Contractor: Matthews-Duax Construction Company, Glenview, Illinois.



TYPICAL SIZES

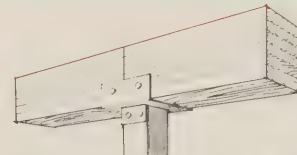
(1/240 Deflection. $f = 2200 + 15\%$ for Short Time Duration of Live Load)

Beam or Purlin		TOTAL LOAD (P. S. F.)					
Span	Spacing	30	35	40	45	50	55
16'	6'	3 1/4 x 8	3 1/4 x 9 5/8	3 1/4 x 9 5/8	3 1/4 x 9 5/8	3 1/4 x 9 5/8	3 1/4 x 11 1/4
	8'	3 1/4 x 9 5/8	3 1/4 x 9 5/8	3 1/4 x 11 1/4	3 1/4 x 11 1/4	3 1/4 x 11 1/4	3 1/4 x 11 1/4
	10'	3 1/4 x 9 5/8	3 1/4 x 11 1/4	3 1/4 x 11 1/4	3 1/4 x 12 7/8	3 1/4 x 12 7/8	3 1/4 x 12 7/8
	12'	3 1/4 x 11 1/4	3 1/4 x 11 1/4	3 1/4 x 12 7/8	3 1/4 x 12 7/8	3 1/4 x 14 1/2	3 1/4 x 14 1/2
	14'	3 1/4 x 11 1/4	3 1/4 x 12 7/8	3 1/4 x 12 7/8	3 1/4 x 14 1/2	3 1/4 x 14 1/2	5 1/4 x 12 7/8
20'	16'	3 1/4 x 12 7/8	3 1/4 x 12 7/8	3 1/4 x 14 1/2	3 1/4 x 14 1/2	5 1/4 x 12 7/8	5 1/4 x 12 7/8
	8'	3 1/4 x 11 1/4	3 1/4 x 12 7/8	3 1/4 x 12 7/8	3 1/4 x 12 7/8	3 1/4 x 14 1/2	3 1/4 x 14 1/2
	10'	3 1/4 x 12 7/8	3 1/4 x 12 7/8	3 1/4 x 14 1/2	3 1/4 x 14 1/2	5 1/4 x 12 7/8	5 1/4 x 12 7/8
	12'	3 1/4 x 12 7/8	3 1/4 x 14 1/2	5 1/4 x 12 7/8	5 1/4 x 12 7/8	5 1/4 x 14 1/2	5 1/4 x 14 1/2
	14'	3 1/4 x 14 1/2	5 1/4 x 12 7/8	5 1/4 x 12 7/8	5 1/4 x 14 1/2	5 1/4 x 14 1/2	5 1/4 x 16 1/8
24'	16'	3 1/4 x 14 1/2	5 1/4 x 12 7/8	5 1/4 x 12 7/8	5 1/4 x 14 1/2	5 1/4 x 16 1/8	5 1/4 x 16 1/8
	18'	5 1/4 x 12 7/8	5 1/4 x 14 1/2	5 1/4 x 14 1/2	5 1/4 x 16 1/8	5 1/4 x 16 1/8	5 1/4 x 17 3/4
	8'	3 1/4 x 14 1/2	3 1/4 x 14 1/2	5 1/4 x 12 7/8	5 1/4 x 14 1/2	5 1/4 x 14 1/2	5 1/4 x 14 1/2
	10'	3 1/4 x 14 1/2	5 1/4 x 14 1/2	5 1/4 x 14 1/2	5 1/4 x 14 1/2	5 1/4 x 14 1/2	5 1/4 x 16 1/8
	12'	5 1/4 x 14 1/2	5 1/4 x 14 1/2	5 1/4 x 16 1/8	5 1/4 x 16 1/8	5 1/4 x 17 3/4	5 1/4 x 17 3/4
32'	16'	5 1/4 x 16 1/8	5 1/4 x 16 1/8	5 1/4 x 17 3/4	5 1/4 x 19 3/8	5 1/4 x 19 3/8	5 1/4 x 19 3/8
	18'	5 1/4 x 16 1/8	5 1/4 x 16 1/8	5 1/4 x 19 3/8	5 1/4 x 19 3/8	5 1/4 x 21	5 1/4 x 21
	8'	5 1/4 x 16 1/8	5 1/4 x 16 1/8	5 1/4 x 17 3/4	5 1/4 x 19 3/8	5 1/4 x 19 3/8	5 1/4 x 19 3/8
	10'	5 1/4 x 17 3/4	5 1/4 x 19 3/8	5 1/4 x 19 3/8	5 1/4 x 21	5 1/4 x 21	5 1/4 x 22 5/8
	12'	5 1/4 x 19 3/8	5 1/4 x 19 3/8	5 1/4 x 21	5 1/4 x 21	5 1/4 x 22 5/8	7 x 21
40'	14'	5 1/4 x 19 3/8	5 1/4 x 21	5 1/4 x 21	5 1/4 x 22 5/8	7 x 21	7 x 21
	16'	7 x 22 5/8	7 x 22 5/8	7 x 22 5/8	7 x 24 1/4	7 x 25 7/8	7 x 25 7/8
	18'	7 x 22 5/8	7 x 24 1/4	7 x 25 7/8	7 x 25 7/8	7 x 27 1/2	7 x 29 1/8
	8'	5 1/4 x 19 3/8	5 1/4 x 21	5 1/4 x 21	5 1/4 x 22 5/8	7 x 21	7 x 21
	10'	5 1/4 x 21	5 1/4 x 22 5/8	5 1/4 x 22 5/8	7 x 21	7 x 22 5/8	7 x 22 5/8
50'	12'	5 1/4 x 22 5/8	7 x 21	7 x 22 5/8	7 x 22 5/8	7 x 24 1/4	7 x 24 1/4
	14'	7 x 21	7 x 22 5/8	7 x 22 5/8	7 x 24 1/4	7 x 25 7/8	7 x 25 7/8
	16'	7 x 22 5/8	7 x 22 5/8	7 x 24 1/4	7 x 25 7/8	7 x 27 1/2	7 x 27 1/2
	18'	7 x 22 5/8	7 x 24 1/4	7 x 25 7/8	7 x 27 1/2	7 x 29 1/8	7 x 29 1/8
	8'	7 x 22 5/8	7 x 22 5/8	7 x 24 1/4	7 x 24 1/4	7 x 25 7/8	7 x 27 1/2

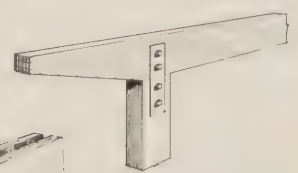
Typical beam-to-pipe column connection.



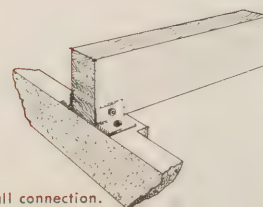
Typical beam-to-column connection.



Laminated beam resting on column with steel strap connection.



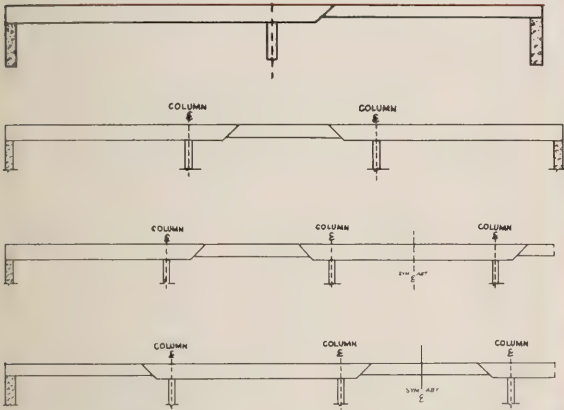
Beam-to-wall connection.



Beam channeled for concealed electrical conduit.



Typical cantilevered beam arrangements



HOLMAN TRANSFER COMPANY WAREHOUSE, Portland, Oregon, is 200' x 500' in size, divided into four 50' x 500' bays. Cantilevered glulam beams of outside bays curve downward to improve roof drainage and lower the outside walls. Beam spacing is 25'.

Architect: G. K. Cochran, Portland.
Contractors: Monson & Sivers, Portland.

SPECIFICATIONS / *GLUED LAMINATED STRUCTURAL MEMBERS*



TOKENEKE ELEMENTARY SCHOOL, Darien, Connecticut. Glulam beam-and-column bents support timber purlins and translucent panels over playroom. Commons room has similar structural framing, and simple beams support the roof over the remainder of the school.

Architects: O'Connor & Kilham, New York City.

Contractors: George L. Hickey, New York City.



BETA THETA PI CHAPTER HOUSE, Corvallis, Oregon uses glulam beams to frame living room and den on the balcony which is reached by a bridge supported by beams cantilevered from framing structure over outdoor living room.

Architects: Church, Newberry, Roehr and Schuette, Portland, Oregon.

Contractor: Quentin Greenough Construction Company, Corvallis, Oregon.



PALA SHOPPING CENTER, San Jose, California, has a center bay of 60-foot span, with lower wings at either side. Structural framing is glulam beams. Clerestory lighting is installed beneath beams of the central wing.

Architects: Victor Gruen and Associates, San Francisco, Los Angeles and New York.

Contractor: Lew Jones Construction Company, San Jose, California.

specifications for glued laminated structural members

(Use for glued laminated arches, beams, rigid frames, purlins, columns, or any other glued laminated structural member.)

1. GENERAL. The glued laminated structural members shall be manufactured by Timber Structures, Inc., Portland, Oregon, or other approved manufacturer of at least five years consistent experience in the successful lamination and fabrication of structural timbers, and having plant facilities adequate for performing the work specified. Field lamination will not be permitted.

2. SHOP DRAWINGS. The fabricator shall submit complete shop drawings for approval prior to fabrication.

3. LUMBER. All lumber for laminating shall be Douglas Fir graded in accordance with West Coast Lumbermen's Association Grading Rules No. 15, and shall consist of structural grade combinations adequate to meet engineering requirements as determined by design. Lumber shall be free of characteristics which prevent intimate contact of surfaces in gluing or which interfere with uniform bending to required curvature. Lumber shall be properly kiln dried for glue laminating and moisture content shall not exceed 16%.

4. ADHESIVES. (For interior use or protected exterior use): Water-resistant casein type glue, with mold inhibitor, conforming to Federal Specifications MMM-A-125 shall be used. (For exterior use exposed to weather or for interior service condition of continuous high humidity): Waterproof phenol, resorcinol or melamine resin glues conforming to Military Specifications MIL-A-397B shall be used.

5. MANUFACTURE AND FINISH. Manufac-



ture shall be in accordance with the latest issue of the "Timber Construction Standards" of American Institute of Timber Construction and the "Standard Specifications for Structural Glued Laminated Douglas Fir Lumber" of the West Coast Lumbermen's Association. Glued laminated members shall be finished to specified AITC Appearance Grade as stated below.

(If factory applied moisture sealer is desired): All surfaces of completed glued laminated members shall be given one factory applied coat of moisture sealer, and all ends coated with end sealer.

6. HARDWARE. The fabricator shall include all necessary hardware and metal shapes required for assembly and erection of glued laminated members except that which is imbedded in masonry or welded to structural steel. Metal shapes to have one coat of shop applied paint containing rust inhibitor.

7. PROTECTION (normally required for Architectural and Premium Appearance grades only). The fabricator shall provide protection for the glued laminated materials during transit. Members shipped in open rail cars or trucks shall be well wrapped in water resistant paper for protection in transit. The erector shall be responsible for proper care and protection of materials during unloading, hauling and erection.

8. INSPECTION. The fabricator shall furnish an AITC Inspection Certificate that the glued laminated members are produced in accordance with provisions of AITC "Inspection Manual for Structural Glued Laminated Lumber". (Alternate: The laminating operations shall be inspected by an approved independent inspection agency who shall furnish an inspection certificate certifying that the glued laminated members are produced in accordance with these above listed specifications).

9. FINISHES (when specified). Timber members shall be given one factory-applied coat of Timber Structures, Inc. sealer-stain to match the color samples submitted to fabricator.

standard appearance grades for glued laminated structural members

In accordance with official recommendations of the American Institute of Timber Construction as adopted May, 1955

Experience has shown that three appearance grades — Industrial, Architectural, and Premium — have a sufficient range to fulfill practically all use requirements.

These grades apply to the surfaces of glued laminated members, and include such items as growth characteristics, inserts, wood fillers and surfacing operations. They do not apply to laminating procedures, decorative or other finishes, wrappings, cratings, or other protective coverings. They do not modify the design stresses, fabrication controls, grades of lumber used, or other provisions of the Standards for Glued Laminated Structural Members.

Industrial Appearance Grade

APPLICATION: Industrial appearance grade is ordinarily suitable for construction in industrial plants, warehouses, garages, and for other uses where appearance is not of primary concern.

SPECIFICATIONS: (a) Laminations may contain the natural growth characteristics of the lumber grade. (b) Inserts or wood fillers are not required. (c) Soffit and face boards shall be free of loose knots and open knot holes. (d) Members shall be surfaced two sides only, permitting an occasional miss along individual laminations.

Architectural Appearance Grade

APPLICATION: Architectural appearance grade is ordinarily suitable for construction where appearance is an important requirement. Any small voids shall be filled by others than the fabricator if the final decorative finish so requires.

In specifying appearance grades it is necessary only to state the desired grade without detailed specifications.

SPECIFICATIONS: (a) Laminations may contain the natural growth characteristics of the lumber grade. (b) In exposed surfaces, voids which cannot be properly filled shall be replaced by the fabricator with clear wood inserts; this includes knot holes and loose knots in excess of $\frac{3}{4}$ " in diameter. At time of placement, insert shall be selected with reasonable care to match grain and color. Filling of any remaining voids, if required, shall be left to other trades. (c) Soffit and face boards shall be free of loose knots and open knot holes. The material shall be selected with reasonable care to match color and grain at scarf and edge joints. (d) Exposed faces shall be surfaced. Misses are not permitted.

Premium Appearance Grade

APPLICATION: Premium appearance grade is for uses which require the finest appearance.

SPECIFICATIONS: (a) Laminations may contain the natural growth characteristics of the lumber grade. (b) In exposed surfaces, voids which cannot be properly filled shall be replaced with clear wood inserts. This includes knot holes and loose knots in excess of $\frac{3}{4}$ " in diameter. Voids $\frac{3}{4}$ " in diameter and under shall have wood inserts or wood filler. At time of placement, insert shall be selected with special care to match grain and color. All such work shall be done by the fabricator. (c) Soffit and face board material shall be clear and selected with reasonable care to match color and grain at scarf and edge joints. (d) Exposed faces shall be surfaced smooth.

Timber Structures trusses. Experience has proved the most practical truss to be the bowstring design with heavy section monochord members which provide a high degree of fire safety and freedom from dimensional changes. These features are incorporated in the Tim-Truss, a thoroughly engineered unit which has been in service for many years in spans up to 250 feet. Web connections are true pin joints which eliminate eccentricity. When provided for in design, these trusses can support monorail installations and other unusual local loadings.

GLUED LAMINATED TRUSSES



MARKET BASKET, Seattle, Washington features clear span shopping area of 128'-1" x 201'-9". Roof is supported by a special lenticular type Tim-Truss, lower chord of which is extended at both ends to provide overhangs of 13'-6".

Architects: Johnston and Campanella, Seattle.

Contractor: Paul Nels Carlson, Seattle.

ADOLPHSON'S BOWLING ALLEY, Greensburg, Pennsylvania. Eight 100-foot Tim-Trusses spaced at 14 feet support the roof over the 100' x 130' bowling area which remains free of all obstructions. Uncluttered appearance of the trusses enables them to remain exposed, eliminating the necessity of a ceiling.

Architect: Gordon C. Pierce, Greensburg, Pennsylvania.

Contractor: L. P. Wineman, Greensburg, Pennsylvania.

BEKINS VAN AND STORAGE COMPANY, Riverside, California uses Tim-Trusses for their 87' x 201'-4" warehouse. With no interior posts to dodge, aisles are laid out according to need, and materials handling equipment is used freely.

Engineer: Clyde Deuel, Los Angeles, California.

Contractor: C. R. Park, Cupertino, California.





SPECIFICATIONS

specifications for tim-truss bowstring trusses

GENERAL: Roof trusses shall be Tim-Truss monochord type as manufactured by Timber Structures, Inc., Portland, Oregon. The truss manufacturer must have at least five years consistent experience in the successful lamination and fabrication of bowstring trusses, and have plant facilities for performing the work specified. Field fabrication will not be permitted.

DESIGN: Trusses are to be designed in accordance with provisions of the current edition of "National Design Specifications" issued by National Lumber Manufacturers' Association and to support live load of (specify); dead load of (specify); ceiling load (specify); special load (specify). Complete shop drawings must be submitted prior to fabrication.

LUMBER: Upper and lower chords shall be glued laminated of Douglas Fir lumber graded in accordance with West Coast

Lumbermen's Association Grading Rules No. 15, and shall consist of structural grade combinations adequate to meet engineering requirements as determined by design loads. Lumber for laminating shall be free of characteristics which prevent intimate contact of surfaces in gluing or which interfere with uniform bending to required curvature. Moisture content shall not be less than 7% nor more than 16%. Web members will be of Douglas Fir and shall have no seasoning requirements.

ADHESIVES: For interior use water-resistant casein type glue with mold inhibitor, conforming to Federal Specification MMM-A-125 shall be used. (Alternate: when exposed to weather or for interior service conditions of continuous extreme high humidity, exterior type phenol, resorcinol or melamine resin glues conforming to Military Specification MIL-A-397B shall be used.)

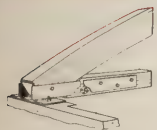
MANUFACTURE: Shall be in accordance with the latest issue of the "Timber Construction Standards" of American Institute of Timber Construction and the "Standard Specifications for Structural Glued Laminated Douglas Fir Lumber" of the West Coast Lumbermen's Assn.

PIECE MARKING: All pieces shall be plainly stamped with a piece mark to correspond with the markings on manufacturer's shop drawings.

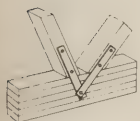
BRACING: The manufacturer of the trusses shall furnish the required vertical sway bracing in alternate bays. This bracing shall be 4" nominal thickness in its least dimension. Struts in the plane of the lower chord will be furnished by truss manufacturer where no ceiling is used.

HARDWARE: Truss manufacturer shall include all necessary hardware and metal shapes required for assembly and erection except that imbedded in masonry or welded to structural steel. All hardware to be furnished black. Metal shapes to have one coat of shop applied paint containing rust inhibitor. All heel, splice, and web connections shall be of steel plate, using shear plate connectors. Bolts in heels and lower chord splices shall be of exact length so that no portion of the thread is bearing on steel plates.

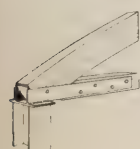
INSPECTION: Manufacturer shall furnish an AITC Inspection Certificate to certify that the glued laminated chords are produced in accordance with provisions of AITC "Inspection Manual for Structural Glued Laminated Lumber."



Heel connection uses heavy steel U-Strap and shear plates.



Web members are connected to chords with bolts and heavy steel straps. Shear plates are added when the stress requires.



Tim-Truss with heel connected to steel I-beam column.

**DIMENSIONS, SIZES AND WEIGHTS OF TYPICAL TIM-TRUSS ROOF TRUSSES
WITH DIMENSIONS OF BEARINGS (1)**

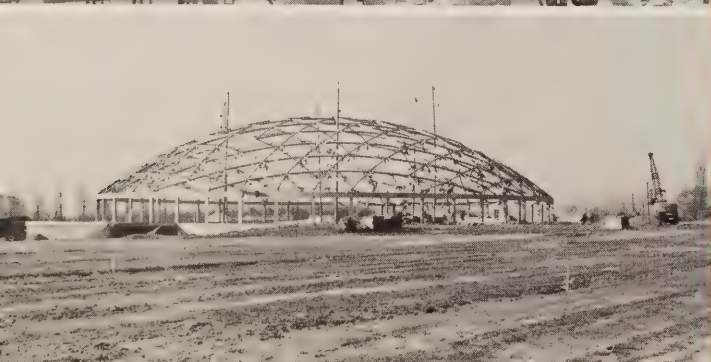
Span	No. of Panels	Truss Height (2)	Roof Height	Arc Length (2)	Comber	Heel Width (3)	Length of Bearings (3)	Truss Weight
40'	6	5' 9"	6' 9 1/2"	41' 10 1/16"	1 1/2"	6"	5"	950 Lbs.
50'	6	7' 2 1/8"	8' 2 5/8"	52' 4 5/16"	2"	6"	6 1/2"	1,120 Lbs.
60'	6	8' 7 3/4"	9' 8 1/4"	62' 10"	2 1/2"	6"	8"	1,530 Lbs.
70'	6	10' 0 3/4"	11' 1 1/4"	73' 3 1/16"	2 3/4"	6"	9"	2,180 Lbs.
80'	8	11' 6 3/8"	12' 6 7/8"	83' 9 5/16"	3"	6"	10"	2,700 Lbs.
90'	8	12' 11 1/2"	14' 0"	94' 3"	3 1/2"	6"	11 1/2"	3,330 Lbs.
100'	8	14' 4 1/2"	15' 5"	104' 8 1/16"	4"	6"	12 1/2"	3,710 Lbs.
110'	10	15' 6 1/8"	16' 7 1/4"	115' 2 3/8"	4 1/2"	7 3/4"	11 1/2"	5,100 Lbs.
120'	10	16' 11 3/4"	18' 0 1/4"	125' 8"	4 3/4"	7 3/4"	11 1/2"	6,230 Lbs.
130'	10	18' 4 3/4"	19' 5 1/4"	136' 1 1/16"	5"	7 3/4"	12 1/2"	7,050 Lbs.
140'	12	19' 9 7/8"	20' 10 1/4"	146' 7 3/8"	5 1/2"	7 3/4"	13 1/2"	8,170 Lbs.
150'	12	21' 3"	22' 3 1/2"	157' 1"	5 3/4"	7 3/4"	14"	9,460 Lbs.

LONGER SPANS AVAILABLE AS DESIRED

NOTES: (1) The above tabular values are for average conditions. Individual designs may vary. (2) Truss height is the vertical distance from bearing line to top of truss at mid-span. Roof height, as shown, is truss height plus depth of typical roof joists and thickness of 1" nominal sheathing. (3) Dimensions as determined for typical case of 40 lbs. per sq. ft. total loading and 20 foot spacing, i.e., 800 pounds per linear foot of truss span. Heel width is also minimum pilaster width.

Timber Structures domes are among the most versatile of structural units. They have been built in clear spans up to 300 feet, and are practical in even greater spans. With a tension ring to resist the horizontal thrust, sidewalls need not be buttressed, and no tying members are required. Ratio of rise to span is low. Section sizes of the glulam members are relatively small since members are in compression, and need not be designed to resist bending stresses. In erection, domes usually are assembled in sections and raised into position with a minimum of heavy equipment.

GLUED LAMINATED DOMES



MONTANA STATE COLLEGE FIELDHOUSE, Bozeman, Montana, is 300 feet in diameter and 1-2/3 acres in area. Clear span roof structure is supported by a dome of glulam timbers. Rise of the dome is 50'-8 7/8". Building accommodates 12,500 for arena sports. Facilities include those of the men's physical education department, physical therapy section, kitchen and eight concession areas, press and broadcast booths.

Architects: Willson and Berg, Bozeman, Montana.

Contractors: Haggerty and Messmer Company, Bozeman.

NEWPORT DUNES RESTAURANT, Newport Dunes, California. In building this unique structure a dome of triangular pattern and 30 feet diameter was erected on top of lenticular ribs spaced at 15 degrees. Exposed glulam dome members create an attractive ceiling pattern.

Architects: Smith & Williams, Pasadena, California.

Contractor: George A. Fuller Company, Los Angeles.

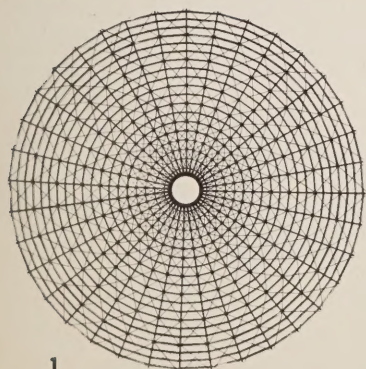
MT. CALVARY CHURCH, Cuyahoga Falls, Ohio, is built around a central auditorium 220'-10" in span. Supporting the roof is a dome of engineered glulam timbers which rests upon concrete pilasters. The dome was raised into position with only six gin poles, and no power equipment was used other than simple hand winches. Two-inch tongue-and-groove sheathing was installed over the dome members. Seating capacity of the auditorium is 5,400.

Architects: A. L. Salzman and Sons, Inc., Chicago.

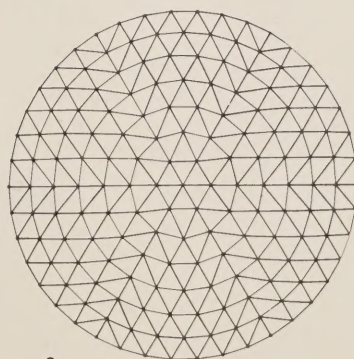
Contractors: Williams and Fellmouth, Akron, Ohio.



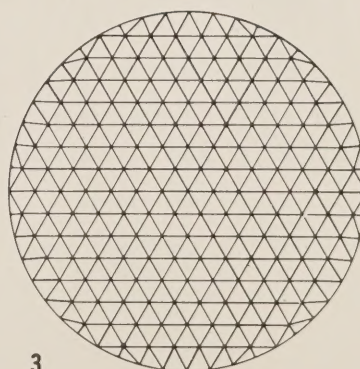
PATTERNS



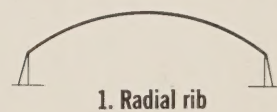
1



2



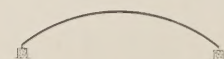
3



1. Radial rib



2. Triangular pattern



3. Triangular pattern

Timber Structures Tim-Deck. Available in 3-inch and 4-inch thicknesses, Tim-Deck combines the beauty of fine wood paneling, effective resistance to destruction by fire, labor-saving construction and excellent insulation. Tim-Deck is available in Western Red Cedar; blonde Engelmann Spruce, White Fir and West Coast Hemlock; Douglas Fir; and Oakpanel and Mahoganypanel. The latter two species have faces of Oak and Mahogany permanently glued laminated to kiln dried decking of Cedar or Douglas Fir. Finishes include smoothly planed V-groove, striated surface and wire brushed surface which brings the winter grain into relief. Because of the even grain structure of Spruce and White Fir the wire brushing is not recommended for these species; nor are striating and wire brushing done with Panel Tim-Deck.

TIMBER DECKING

DETAILS

*also available in
other hardwood species

Mahogany
Panel*

Oak*
Panel

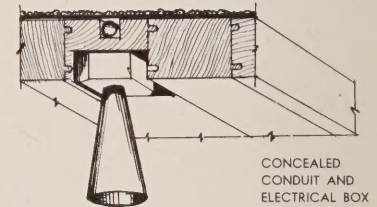
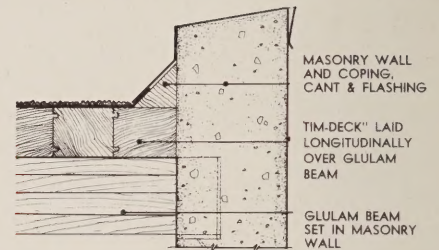
Douglas
Fir

Blonde

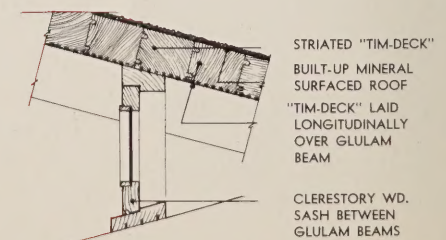
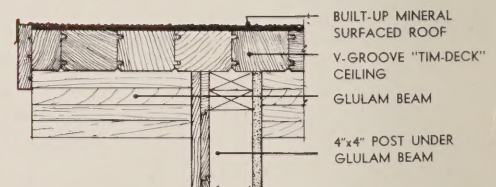
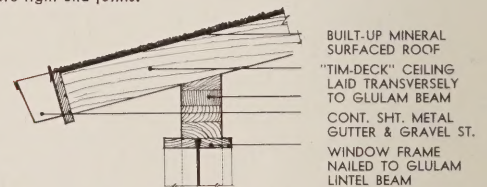
Western Red
Cedar

STRIATED

WIRE BRUSHED



Ends of Tim-Deck are
cut with a 2 degree bevel
to assure tight end joints.





SPECIFICATIONS

installation of tim-deck

Tim-Deck members are attached to the supporting members by toe nailing, then are spike laminated approximately every 30 inches by driving spikes through holes drilled at the factory. Material is most economical when used in random lengths and applied in partial cantilever lay-up. Maximum strength is obtained by locating end joints roughly within one-quarter span from the supporting members and with two or more intervening courses before repetition.

effective insulating qualities

Tim-Deck provides in itself excellent insulation which is more than sufficient for most purposes and climates. The natural insulating values of the heavy timber sheathing is preserved by the close fitting double tongue-and-groove side surfaces. Following table of heat loss shows this heavy decking to be more effective than most commonly used roofing arrangements.

Tim-Deck with Built-Up Roof		1-inch Wood Sheathing with Built-Up Roof and				
		No Insulation	*Metal Lath and 3/4-inch Plaster Ceiling	*3/4-inch Gypsum Board Ceiling	1/2-inch Wood Fibre-board Insulation	1-inch Wood Fibre-board Insulation
3-inch	4-inch					
0.22	0.17	0.51	0.31	0.31	0.28	0.20

*Ceiling separated from roof deck by at least 3/4-inch air space. Heat loss figures expressed in BTU per hour per square foot per Fahrenheit degree difference in temperature between the air on two sides, with outside wind velocity of 15 MPH.

suggested decking specifications

Decking shall be Tim-Deck as manufactured by Timber Structures, Inc., Portland, Oregon, or approved equal.

LUMBER GRADES: Standard Grade Cedar Tim-Deck shall be in accordance with paragraph 427-b, WCLA Grading Rules number 15.

Standard Grade Blonde Tim-Deck—Engelmann Spruce, White Fir or West Coast Hemlock—shall be in accordance with paragraph 127-b, WCLA Grading Rules number 15; or paragraph 432A and 433A, Western Pine Association Standard Grading Rules, 1956, further face graded to eliminate wane and skips.

Standard Grade Douglas Fir Tim-Deck shall be in accordance with paragraph 127-b, WCLA Grading Rules number 15.

MOISTURE CONTENT: Average 15% kiln dried.

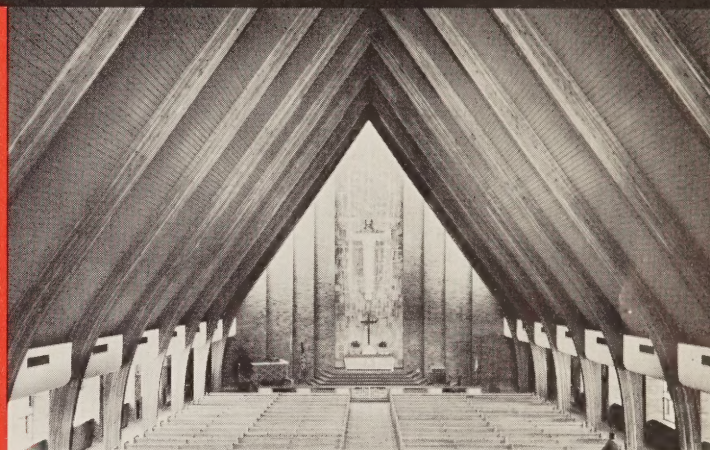
LENGTHS: Shall be random lengths with minimum of 40% 16 feet or longer (alternate—in specified length from 6 to 18 feet in even foot multiples).

MANUFACTURE: Tim-Deck is to be smoothly manufactured to double tongue-and-groove pattern. V-edge 1 side, with holes to be drilled on the 3" or 4" face for nailing at intervals of 30", centered between the tongues and approximately 4" in length. Ends are to be trimmed on a slight bevel of 1° to 2° away from the face of the piece.

NET SIZES:

4x6 Nominal— $3\frac{1}{2}" \times 5\frac{1}{8}"$ } overall size including tongues
 3x6 Nominal— $2\frac{7}{8}" \times 5\frac{1}{8}"$ }

Finish face width of both thicknesses is $5\frac{1}{4}"$.



CHURCH OF THE IMMACULATE HEART OF MARY, Maplewood, N. J. uses blonde Tim-Deck for sheathing, insulation and finished ceiling.

Architect: Arthur Rigolo, Clifton, N. J.

Contractor: Bryant Construction Company, New Arlington, N. J.

calculating area takeoffs and board footage

To compute the proper foot board measure required for material of 4-inch nominal thickness, determine the area to be covered and multiply by 4.6 to convert square footage to FBM. For material of 3-inch nominal thickness multiply the area by 3.45. This will give the exact mathematical footage required to cover the area.

ALLOWABLE UNIFORMLY DISTRIBUTED TOTAL ROOF LOAD

Blonde Tim-Deck and Cedar Tim-Deck

Load values listed are the total allowable loads, including live load and dead load, in pounds per square foot applied as a uniformly distributed load; weight of the Tim-Deck is to be included in the dead load. Allowable loadings on Douglas Fir Tim-Deck are 30% greater than those shown below.

3" x 6"		Weight of TIM-DECK = 5.65 P.s.f.						
Span in Feet	SINGLE SPAN				PARTIAL CANTILEVER			
	Bending	DEFLECTION			Bending	DEFLECTION		
		1/360	1/240	1/180		1/360	1/240	1/180
9	114	50	75	100	114	94	114	114
10	92	36	54	72	92	68	92	92
11	76	27	41	54	76	51	76	76
12	64	21	31	42	64	40	60	64
13	54	16	25	32	54	31	47	54
14	47	13	20	26	47	25	37	47
15	41	11	16	22	41	20	30	40
16	36	9	13	18	36	17	25	34

4" x 6"		Weight of TIM-DECK = 7.55 P.s.f.						
12	113	50	75	100	113	94	113	113
13	96	39	59	78	96	74	96	96
14	83	31	47	62	83	59	83	83
15	72	25	38	50	72	48	72	72
16	63	21	31	42	63	40	60	63
17	56	17	26	34	56	33	50	56
18	50	15	22	30	50	28	42	50
19	45	12	19	24	45	24	35	45
20	41	11	16	22	41	20	30	40

detailed literature free upon request

To provide detailed information on specific structure types built with framing of engineered timber, brochures are published on churches, schools, homes, Tim-Deck and bridges. All are well illustrated and contain valuable engineering data. In addition a monthly publication, "Tim-Press", discusses outstanding projects of current general interest. To obtain any of the brochures or to be put on the Tim-Press mailing list, telephone or write to any of the following offices.



TSB 2—Bridges



TSG 14—Churches



TSG 24—Tim-Deck



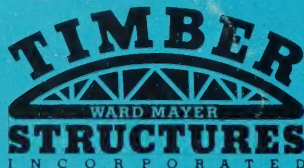
Tim-Press



TSG 16—Schools



TSG 12—Homes



Head Office and Plant: P. O. Box 3782, Portland 8, Oregon

Associated Company

TIMBER STRUCTURES, INC. OF CALIFORNIA
1952 Wright Avenue, Richmond 3, California

Eastern Division

Division Headquarters, Timber Structures, Inc.
P. O. Box 278, 74 N. Central Ave., Ramsey, N. J.

ALABAMA
Rayll S. Morgan
P. O. Box 3206
Birmingham 5, Alabama

CONNECTICUT
Timber Structures, Inc.
P. O. Box 343
West Hartford 7, Conn.

DIST. OF COLUMBIA
Ewing Lumber & Millwork Corp.
10500 Ewing Road
Beltsville, Maryland

FLORIDA
Laminated Structures, Inc.
3140 N. W. 41st St.
Miami 42, Florida
Dan Carter Co.
1818 S. Monroe Street
Tallahassee, Florida
Edward F. Zibell
6134 Stetson Road
Jacksonville, Florida

GEORGIA
K. B. Smith
926 West Peachtree St.,
N.W.
Atlanta 9, Georgia

KENTUCKY
Faulkner-Clark
Material Sales
234 North Upper
Lexington, Kentucky

MARYLAND
Ewing Lumber & Millwork Corp.
10500 Ewing Road
Beltsville, Maryland

MASSACHUSETTS
Arthur Jacobson Co., Inc.
45 Newbury Street
Boston 16, Mass.

MICHIGAN
Timber Structures, Inc.
950 North Hunter Blvd.
Birmingham, Michigan
Grand Rapids Screen Co., Inc.
1241 Fulton Street, East
Grand Rapids 3, Michigan
Payne-Rosso
P. O. Box 367
Lansing 2, Michigan
Dooley Sales
P. O. Box 821, E. S.
Saginaw, Michigan

NEW JERSEY
Timber Associates, Inc.
514 Commercial Trust Bldg.
Philadelphia 2, Pennsylvania
Timber Structures, Inc.
P. O. Box 278
Ramsey, New Jersey

NEW YORK
George W. Burnett, Inc.
130 West Chippewa Street
Buffalo 2, New York
Moody Associates
43 S. Middleneck Road
Great Neck, N. Y.
Timber Structures, Inc.
103 Park Avenue
New York 17, N. Y.
L. Treman Company
703 Temple Building
Rochester 4, N. Y.
B. R. Johnson & Son
5900 South Salina Street
Syracuse 5, New York
B. R. Johnson & Son
1002 Academy Street
Watertown, N. Y.

NORTH CAROLINA
Montague & Company
P. O. Box 633
Charlotte, N. C.
Montague & Company
P. O. Box 2972
Winston-Salem, N. C.

OHIO
Lloyd Towers
6519 Crestview Avenue
Cincinnati 13, Ohio
Timber Structures, Inc.
426 S. Broadway
Medina, Ohio
John B. Roadhouse
1220 Madison Avenue
Toledo 2, Ohio

PENNSYLVANIA
Timber Associates, Inc.
514 Commercial Trust Bldg.
Philadelphia 2, Pennsylvania
Harry R. Robb
847 Hawthorne Drive
Pittsburgh 35, Pennsylvania

SOUTH CAROLINA
Bass Building Specialties, Inc.
P. O. Box 5055
Columbia, S. C.

TENNESSEE
Tennessee Structural Products Co.
4305 Chapman Highway, S.E.
Knoxville, Tennessee

WEST VIRGINIA
The McKnight Company
314 26th St., S.E.
Charleston 4, W. Va.

Central Division

Division Headquarters, Timber Structures, Inc.
4401 N. Ruby Street, Schiller Park, Illinois

ARKANSAS
Berlin Wilson Co.
107 Main Street
Little Rock, Arkansas

ILLINOIS
Timber Structures, Inc.
4401 N. Ruby Street
Schiller Park, Illinois

INDIANA
Structural Timbers, Inc.
1340 Madison Avenue
Indianapolis, Indiana
Architects and Contractors Service, Inc.
P. O. Box 182
Mishawaka, Indiana

IOWA
Swanson Sales, Inc.
2737 Douglas Ave.
Des Moines, Iowa

KANSAS
Blair Page
P. O. Box 972
427 East Lewis
Wichita, Kansas

KENTUCKY
J. W. Shaughnessy Co.
P. O. Box 144
Valley Station, Kentucky

MINNESOTA
Timber Structures, Inc.
1000 W. 79th Street
Minneapolis 20, Minn.

MISSOURI
Timber Structures, Inc.
7833 Wornall Road
Kansas City 14, Missouri
Structural Services, Inc.
106 W. Madison Avenue
Kirkwood 22, Missouri
Southwestern Insulation and Material Company
1301 St. Louis Street
Springfield, Missouri

NEBRASKA
Frank L. Young Co.
2565 Dodge Street
Omaha 31, Nebraska

TENNESSEE
Modern Doors & Windows, Inc.
P. O. Box 5161
Memphis 12, Tennessee
Whittemore Products Company
4012 Hillsboro Road
Nashville, Tennessee

WISCONSIN
Roger W. Nelson & Company
1616 N. Sixth Street
Milwaukee 12, Wisconsin

Timber Structures, Southwest

Headquarters, Timber Structures, Southwest
2523 McKinney Avenue, Dallas 1, Texas

NEW MEXICO
Welch-Erwin Corp.
P. O. Box 681
Albuquerque, N. M.

OKLAHOMA
Murray R. Womble Co.
P. O. Box 3323
Oklahoma City 5, Okla.
Murray R. Womble Co.
216 E. 16th Street
Tulsa 19, Okla.

TEXAS
Timber Structures, Southwest
2523 McKinney Avenue
Dallas 1, Texas
M. L. Hutchins & Son
P. O. Box 3102, Station A
El Paso, Texas
T. Victor Carter
2422 Quenby Street
Houston, Texas

W. R. Batson Co.
P. O. Box 1106
Lubbock, Texas
Rufus A. Walker & Co.
P. O. Box 8357
San Antonio, Texas
Lester Prud'homme
P. O. Box 572
Texarkana, Texas
Central Texas Building Supply
P. O. Drawer 7368
Waco, Texas

Western Division

Division Headquarters, Timber Structures, Inc.
P. O. Box 3782, Portland 8, Oregon

ARIZONA
Dean Davis
4509 N. 12th Drive
Phoenix, Arizona

CALIFORNIA
Timber Structures, Inc.
9408 Telegraph Road
Downey, California

COLORADO
Denver Wood Products Co.
1945 West Third Avenue
Denver, Colorado

HAWAII
American Factors, Ltd.
P. O. Box 3230
Honolulu, Hawaii

IDAHO
The Casco Company
P. O. Box 335
Boise, Idaho

NEVADA
Laing-Garrett Construction Specialties
1307 South A Street
Las Vegas, Nevada

OREGON
Timber Structures, Inc.
P. O. Box 3782
Portland 8, Oregon

UTAH
Knudsen Builders Supply Co.
P. O. Box 416
Salt Lake City 10, Utah

WASHINGTON
Timber Structures, Inc.
310 Hoge Building
Seattle 4, Washington
Timber Structures, Inc.
W. 242 Riverside
Spokane 15, Washington